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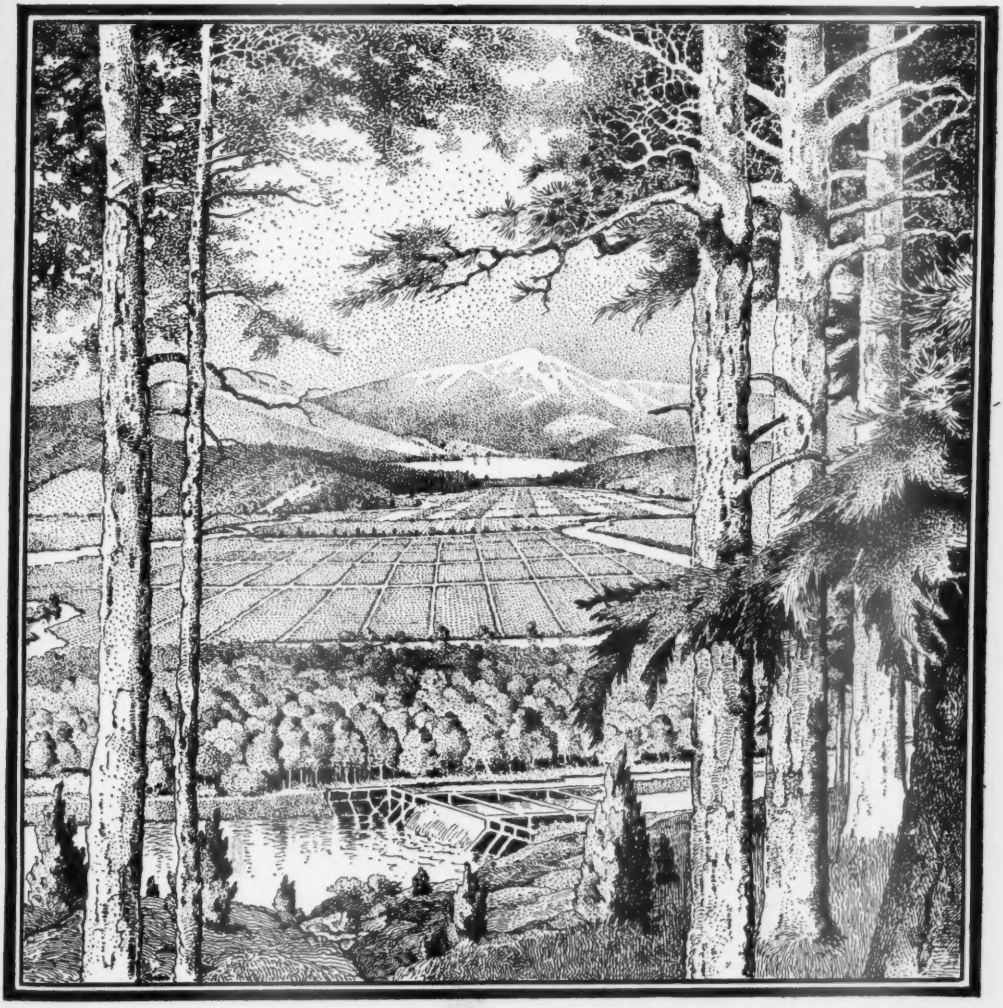

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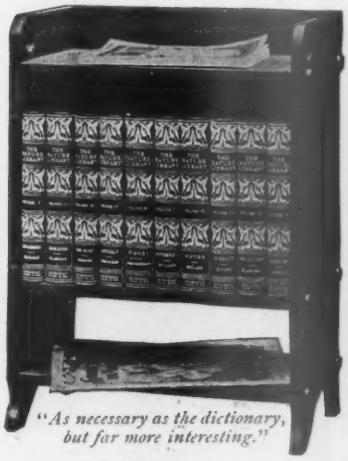

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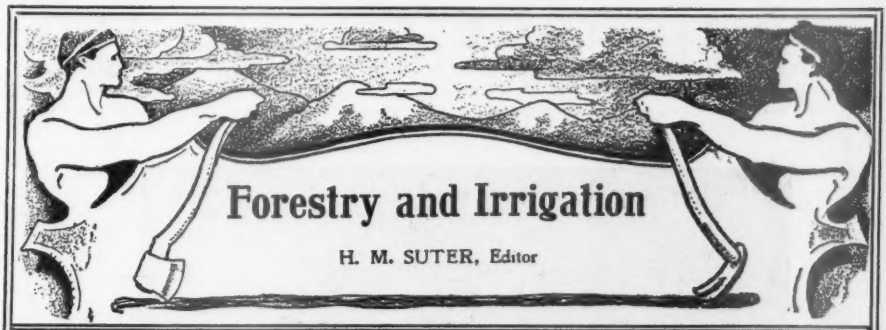

Forestry and Irrigation

H. M. SUTER, Editor

CONTENTS FOR SEPTEMBER, 1904

OLD STONE AQUEDUCT . . . . . *Frontispiece*

NEWS AND NOTES

A New Term	389	American Mining Congress	394
Well Records	389	Trial of Forestry	395
A Good Recommendation	390	Progress in Idaho	395
Irrigation Congress Notes	390	Modern Irrigation Laws	395
Proposed Reserve in Wisconsin	390	Cooperative Irrigation	396
Wisconsin and Fires	390	New Members	396
Underflow of Arkansas	391	Course in Forestry	396
Scene before a Forest Fire	392	Opportunity for Woodlot Owners	397
After a Forest Fire	393	Power Development in Missouri	398
Withdrawn for Yakima Project	394	Bureau of Forestry Field Work	398

MR. HOMER HAMLIN (*with portrait*) 399

FORESTRY AT THE WORLD'S FAIR (*Illustrated*) . . Alfred Gaskill 400

SOUTHERN FLORIDA (*Illustrated*) . . . . . Dr. John Gifford 406

THE IMPERIAL VALLEY OF CALIFORNIA (*Illustrated*) . George Bellis 413

FORESTRY ON EDWARDS PLATEAU (*Illustrated*) 418

FOREST CONDITIONS IN WESTERN WISCONSIN (*Illustrated*) Dr. L. H. Pammel 421

CAMP LIFE AT THE YALE SUMMER SCHOOL OF FORESTRY (*Illustrated*) Q. R. Craft 427

TWELFTH IRRIGATION CONGRESS 431

FOREST FIRES 433

FORESTRY AND IRRIGATION is the official organ of the American Forestry Association. Subscription price $1.00 a year; single copies 10 cents.

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Entered at the Post Office at Washington, D. C., as second-class mail matter.

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Forestry and Irrigation.

VOL. X. SEPTEMBER, 1904. NO. 9.

NEWS AND NOTES.

A New Term. Mr. Gifford Pinchot in the accompanying letter proposes a new word for use in forestry, and one that seems not only good, but necessary. As he explains it, "silvics" deals with the behavior of trees in the forest in relation to their environment, or is the science which has to do with the life of forest trees. But the letter is self-explanatory:

Mr. H. M. SUTER,
Editor Forestry and Irrigation,
Washington, D. C.

DEAR SIR: I submit herewith a new term and its definition, which I desire to propose for use in forestry. It is "silvics." It would, for example, if practically used, replace the term "silvicultural characteristics," so that we would speak of the silvics of a tree just as we would speak of the optics of a kind of glass. With silvics in use, then silviculture would be restricted to a definite use in connection with actual work in the woods, or to the reproduction, planting, and tending of woods, while silvics would denote the knowledge necessary for a man who desired to practice silviculture, just as an engineer would have a knowledge of mechanics. The word is formed upon the analogy, for example, of words like optics, which deals with the relation of substances to light, or mechanics, which deals with the behavior of forces and their effect on matter in general.

Very sincerely yours,
GIFFORD PINCHOT,
Forester.

Well Records. The United States Geological Survey has recently perfected plans for the systematic collection and preservation of well records and samples. The demand for information regarding wells has become so great that the Survey has decided to issue an annual publication containing a brief account of the wells bored each year. This report will be published as near the beginning of the year as practicable, and will be sent to all those who apply for it. It will contain the names and addresses of persons doing well work, and will summarize the work done by them in the preceding year.

In order to obtain data for such a year book, the Survey wishes to make arrangements with well drillers and well owners to send samples and records to the Survey's headquarters in Washington, D. C. On receipt of names of persons willing to save samples of well borings, the Survey will at once send them supplies of canvas bags in which they may transmit them through the mails without paying postage. As these samples may be sent as often as the drillers visit the postoffice, there is no danger that they will accumulate and become burdensome. For the keeping of a log, a convenient pocket memorandum book will also be provided.

It is to be hoped that the drillers and well owners of the country will appreciate the importance of the Survey's effort, and will coöperate so heartily as to assure its complete success. It should appeal to them for several reasons:

First. Their names and work will be kept before a class of readers interested in well drilling.

Second. Records of their work will be carefully filed in the office of the Survey, and will be readily available to them at any time, so that in case their notes are lost they can be duplicated.

Third. Their coöperation will aid materially in the study of the geologic

structure of the United States, and will thus assist in obtaining knowledge which can not fail to be of ultimate benefit to well drillers.

It may sometimes be necessary to regard the records as confidential. In such cases the information will be carefully guarded, and used only under the conditions stipulated by the informant.

The Director of the Survey will be glad to have an expression of opinion regarding this work from well owners and drillers, and will be grateful to them for any suggestions.

A Good Recommendation. In a letter from Mr. Hutchins, Conservator of Forests at Cape Town, mention is made of a student who comes from South Africa to attend the Yale Forest School this fall. This is a feather in the cap of American forest school work and its practical applicability to all conditions, as well as a special tribute to the reputation and value of the institution at Yale.

Irrigation Congress Notes. Everything promises well for the irrigation congress to be held at El Paso, November 15 to 18. This is the twelfth national gathering, and Executive Chairman Boothe expects not less than 3,000 delegates, besides a great number of persons who will take advantage of the trip. It has been suggested that President Roosevelt and President Diaz, the "grand old man" of Mexico, may meet at the congress, held near the international boundary line. It would be a unique occasion and the first of its kind in American history. At any rate, it is practically assured that President Diaz will be present, for he is deeply interested in irrigation and the reclamation of large arid tracts of land in the northern and central portions of Mexico, and is willing to encourage any movement tending to the betterment of agricultural conditions in his domain and along the adjacent Rio Grande borders. It is his intention in November to visit Europe after touring the United States, and it is his purpose, as already signified, to stop at El Paso and attend the National Irrigation Congress.

During his absence from Mexico, Vice-President Ramon Corral will occupy the office of chief executive, and President Diaz will be permitted, for the first time since his ascendency to power in the Republic, to leave for an indefinite period the country whose destinies he has controlled for more than a generation.

Proposed Reserve in Wisconsin. Mr. E. M. Griffith, superintendent of the state forests of Wisconsin, has requested the Land Commissioners to withdraw from sale, pending a detailed examination as to their suitability for the purposes of a forest reserve, some 24,000 acres of land in Iron county, that state. The land being considered adjoins some 10,000 acres of forest reserve in Vilas county, and also the Lac du Flambeau Indian Reservation, which contains over 80,000, making a total of over 114,000 acres, all of which should be protected from fire and logged conservatively. Much of the Iron County area is swamp and marsh land which should be replanted to forest, provided that they can not be made fit for agriculture by proper cultivation and drainage. Mr. Griffith is having a careful examination made of all these lands in order that he may report to the legislature which should be retained for reserve and which should be re-offered for sale. Both the Department of Agriculture and the Geological Survey of the University of Wisconsin are assisting in the work of examination and survey.

Wisconsin and Fires. Undoubtedly the greatest forest problem in Wisconsin, as elsewhere, is found in forest fires. During most of this year, however, there were no bad fires, except in May, which was very dry. The forest fire or fire warden law of Wisconsin has been found a good one, except for the defect that the compensation is so small that it is hard to get the best men to serve. About

300 have been appointed during the first part of the year, but by September 1, to make provision for possible fall fires, there were 450 in service. The hardest thing to contend against has been the indifference of the people, who have become so accustomed to forest fires that they accept them as a matter of course, and unless the fire is burning in valuable virgin pine practically no attention is paid to it, and the accepted program is to let it run and trust to rain to put it out before it does a great deal of damage. Wardens are, however, instructed to rigidly enforce the two following laws of the statutes of Wisconsin:

"*Setting and Failing to Put Out Fire.*—Whenever the fire warden of any town becomes convinced that a dangerously dry time exists in its vicinity, and that it is imprudent to set fires upon any land, he shall post or cause to be posted a notice in three public places in such town forbidding the setting of such fire therein, and after the posting of such notices no person shall set any fire upon any land in said town, except for warming the person or cooking food, until written permission has been received from one of the fire wardens of said town. All persons who start camp fires shall exercise all reasonable precautions to prevent damage therefrom and shall entirely extinguish the same before leaving them. Every person violating any provision of this section shall be punished by a fine of not more than fifty dollars or by imprisonment in the county jail not more than six months for each offense.

"*Same.*—Any person who shall build a fire on any lands in this state not his own or under his control, except as hereinafter provided, shall, before leaving the same, totally extinguish it, and upon failure to do so shall be punished by a fine not exceeding one hundred dollars or by imprisonment in the county jail not exceeding one month, or by both such fine and imprisonment. Any person who shall willfully or negligently set fire to or assist another to set fire on any land, whereby such land is injured or endangered, or shall willfully or negligently suffer any fire upon his own land to escape beyond the limits thereof, to the injury of the land of another, shall be punished as hereinbefore provided and be liable to the person injured for all damage that may be caused by the fire."

Underflow of Arkansas.

The investigation of the underflow in the Arkansas River Valley in western Kansas, under the direction of Mr. Charles S. Slichter, of the U. S. Geological Survey, is drawing to a close. Operations have been extended to a line of stations at Deerfield, Kansas, and in two locations near Hartland. The conditions at Deerfield were found to be similar to those near Garden City. The materials are not quite as uniform, but the average ground water velocities are quite as high.

The range of velocities near Hartland were from 6 to 24 feet per 24 hours, and the general direction of seepage is, as at former stations, in a general easterly direction, corresponding to the slope of the valley.

After carefully going over the entire situation, Mr. Slichter has concluded that the most feasible site for an infiltration gallery is in the neighborhood of Deerfield, at a point about 1½ miles above the headgates of the Farmers' Ditch, and if a successful gallery can be constructed its waters could discharge into the Farmers' Ditch and so reach the uplands.

The investigation shows that water can be pumped so cheaply in the bottom lands of the Arkansas Valley that an infiltration gallery designed to provide water for such lands would be impracticable. At a point near Lakin and Hartland there is found the "mouth" of the disappearing stream known as Bear Creek. This is a perennial stream that disappears as soon as it reaches the sand hills, 5 to 10 miles south of the channel of the Arkansas. Mr. Slichter measured the underflow in the dry "flood channel" of Bear Creek and found that the motion is across the channel of the creek, but down stream, with reference to the Arkansas valley, following the usual direction of the water of the Arkansas Underflow.

SCENE IN THE SPLENDID FORESTS OF THE NORTHWESTERN UNITED STATES. DESTRUCTIVE FOREST FIRES HAVE BEEN RAGING IN THIS SECTION FOR NEARLY TWO MONTHS PAST.

AN IDAHO FOREST DESTROYED BY FOREST FIRES.

In line with the channel of Bear Creek, as it is about to emerge from the sand hills, is a small body of water known as Clear Lake. An investigation of this lake, looking to its usefulness to the water users on the south side of the Arkansas River, was made. A hydrographic map was made and a test well, 70 feet deep, sunk in the bottom of the lake. Its waters were found to be lower than the river, and its bottom is composed of about 50 feet of black mud.

Test borings and underflow measurements in the rock narrows of the Arkansas, above Lakin, were made, and there are indications that a rock floor extends across the channel at this point. The work on the Arkansas has been full of interest and has been successfully carried on in spite of the constant troublesome floods which made it extremely difficult.

Withdrawn for Yakima Project. In compliance with the recommendation of the acting Director of the U. S. Geological Survey, the Secretary of the Interior has temporarily withdrawn from any form of disposition whatever the following described lands, except any tracts the title to which has passed out of the United States, lying partly in surveyed and partly in unsurveyed land in Yakima county, State of Washington, surrounding Lakes Clealum, Kachess, and Keechelus. These lands are temporarily withdrawn from entry for irrigation works in connection with the proposed Yakima project.

Clealum Reservoir Site.—Township 20 north, range 14 east, sections 2, 3, 4, 10, 11, and 12. A strip of land one-half mile wide, 7½ miles long, extending on the west side of Lake Clealum and Clealum River in a northerly direction from the north line of township 20.

A strip of land one-half mile wide, 8 miles long, extending along the east bank of Clealum Lake and Clealum River, extending from the north line of township 20 in a northerly direction.

Kachess Reservoir Site.—A strip of land one-half mile wide, 12 miles long, extending on the west bank of Kachess Lake, Little Kachess Lake, and the main streams flowing into the northerly end of Little Kachess Lake and between Little Kachess Lake and Kachess Lake, said strip of land extending from the north line of township 20 north in a northerly direction a distance of 12 miles.

A strip of land one-half mile wide, 12 miles long, extending along the east bank of Kachess Lake, Little Kachess Lake, the river flowing between Kachess Lake and Little Kachess Lake, and the river flowing into the north end of Little Kachess Lake, said strip of land extending 12 miles in a northerly direction from the north line of township 20 north, said land being unsurveyed.

Keechelus Reservoir Site.—A strip of land one-half mile wide, 4½ miles long, extending along the west bank of Keechelus Lake.

A strip of land 1 mile wide, 1 mile long, extending along the west bank of Yakima River and south of the strip of land hereinabove described.

A strip of land 1 mile wide, 2½ miles long, extending along the west bank of Gold Creek north of Keechelus Lake.

A strip of land one-half mile wide, 3½ miles long, extending along the east bank of Keechelus Lake.

A strip of land one-half mile wide, 1 mile long, along the east bank of Yakima River, adjoining the above-described strip of land on the south and east.

A strip of land one-half mile wide, 3 miles long, extending along the east bank of Gold Creek north of Lake Keechelus, all of said land being on unsurveyed ground.

American Mining Congress. During the sessions of the American Mining Congress, held at Portland, Oregon, during the latter part of August, addresses were made by Mr. Newell and Mr. Pinchot, of the Public Lands Commission. The following resolutions were adopted:

"*Resolved*, That the American Mining Congress heartily favors the con-

servative use of forest resources, whether in public or in private hands, and in particular the creation and management of forest reserves under practical business-like rules and regulations, to the end that local timber supplies may be maintained for mining and other uses; and,

"*Resolved*, That the interest of the mining industry, to which timber and water alike are essential, the care and management of all government forest reserves, except as to titles, should be transferred from the General Land Office to the United States Department of Agriculture in accordance with the recommendations of the President, the Secretary of the Interior, and the Commissioner of the General Land Office."

Trial of Forestry. As the result of investigations and representations of Mr. E. A. Sterling and Mr. W. F. Hubbard, of the Bureau of Forestry, the Madera Sugar Pine Lumber Company, a large lumber concern in the middle Sierras, has decided to try forty acres of woodland under forestry regulations as an experiment. Upon this tract a system of fire protection and a method of conservative lumbering will be put into practice immediately. It is the intention to lumber this land in such a manner that the maximum amount of timber can be removed and at the same time assuring a reproduction of the valuable species and a subsequent protection of the same from fire. Only the simplest and cheapest methods will be experimented with, but if definite results can be obtained the knowledge gained will be of great value to practical work.

Progress in Idaho. Mr. D. W. Ross, Engineer in charge of the reclamation work in Idaho, reports active operations in that state during the month of August, as follows:

Minidoka Project.—During the month the topographic parties finished taking topography on the north side of Snake River; final location was made of the North Side Canal down to the first main branches, test pits being sunk every 300 feet and borings made about every 100 feet. Investigations were completed at the site for the power-house, and a map prepared showing by 10-foot contours the lay of the bed rock at this place. An examination was made of lands near the upper river to be flooded by backwater, and estimates of their value made. Preparations for actual construction will be pushed rapidly during the coming month.

Payette-Boisé Project.—The assistant engineers in charge of field parties in this section completed surveys of the preliminary location of the main canal systems of the Payette-Boisé project, besides doing considerable line topography on same.

Dubois Project—Surveys for reservoir sites were made during the month on the headwaters of Fall River and in the vicinity of Lewis and Shoshone lakes on the South Fork of Snake River. In the opinion of the engineers in charge of this work, it will be feasible to divert the waters of South Fork into Fall River drainage, converting Lewis and Shoshone lakes into a reservoir which may be used in connection with either stream.

Reservoir surveys were made in August on the Big and Little Wood rivers and Big Lost River, and reconnaissance surveys on the Payette River were completed. The engineer in charge of this work is now engaged in platting up the results of his investigations on the Boisé and Payette drainage.

Stream-gaging work was kept up throughout the month and a great deal of canal-measurement work was done on the upper Snake River.

Altogether the progress made in Idaho by the engineers of the Reclamation Service is most gratifying, not only to the members of the Service, but to every citizen who has the welfare of this section at heart.

Modern Irrigation Law. Mr. Morris Bien, of the United States Reclamation Service, at the request of the two commissions appointed by the governors of Oregon and Wash-

ington, has prepared a draft of an irrigation code to be considered by these commissions and presented to their legislatures next winter. It is hoped that the two states will adopt substantially the same code of law upon this subject. The draft by Mr. Bien is prepared along the lines indicated as necessary by modern development of irrigation work. It incorporates the fundamental principles of irrigation law declared in the National Reclamation Act, that beneficial use is the basis, the measure, and the limit of water rights. It incorporates also several provisions that will be of importance in connection with the work of the Reclamation Service in the construction of large irrigation systems. This work will be greatly facilitated by the enactment of such provisions. The salient features of this draft will be presented to our readers in the October issue of FORESTRY AND IRRIGATION.

Co-operative Irrigation. Many Eastern farmers would have their eyes opened as to the value of the water running through their farms if they could see the irrigation development in the Milk River Valley and how easy it is to construct small irrigation systems.

An irrigation canal has just been completed at Hinsdale—the Rock Creek Canal—which will water sixty 160-acre farms. Every particle of the work has been done by the owners of these farms. Each man's work and team has been credited against the cost of the construction, and the actual cash outlay has been less than $1 per acre. The total cost of the building of the dam, the main canal, and the lateral ditches and actually getting the water onto the land is about $5 per acre. This is an extremely favorable condition, and the men who have gone into this undertaking are fortunate. They now have land with a perpetual water right, the crops are assured, and the average homestead will produce $1,500 a year above all expenses Better than that, it will produce, with intelligent handling by some of the owners, $2,000 or $2,500, for agriculture in that section of the northwest is just emerging from a comparatively crude state. It is a region where 35 bushels of wheat, 50 bushels of barley, and 60 bushels of oats to the acre can be produced. It is another case of the development of a mere flag station into a thriving community.

New Members. The following persons have joined the American Forestry Association since June 30, 1904:

Besley, F. W., Halsey, Neb.
Browne, Mrs. George, 407 G street, S., Tacoma, Wash.
Bryant, John Duncan, Box 1955, Boston, Mass.
Costikyan, S. S., 62 Harrison street, Montclair, N. J.
Detwiler, S. B., Bureau of Forestry, Washington, D. C.
Edwards, Samuel, Hudson, N. Y.
Grimes, E. P., Jonesburg, Maine.
Hately, John C., 71 Board of Trade building, Chicago, Ill.
Hurst, Edgar R., Forestry Bureau, Manila, P. I.
Jay, B. F., Mesa, Colo.
Mason, Miss Cassity E., "The Castle," Tarrytown, N. Y.
Merrill, H. G., Andover, Mass.
Mixer, Charles A., Rumford Falls, Maine.
Parnay, S. Y., 167 Pearl street, Pasadena, Cal.
Ryerson, A. N., Noroton Heights, Conn.
Searle, Avery T., care of Bassett & Co., Pasadena, Cal.
Sheldon, Mrs. Nicholas, Box 188, Cohassett, Mass.
Shipway, John H., Noroton Heights, Conn.
Spafford, Dr. F. A., Flandreau, S. Dak.
Stevens, M. T., North Andover, Mass.
Stuart, R. Y., Carlisle, Penn.
Wells, George T. (*Life member*), Drifton, Pa.
White, T. Brook, Belle Fourche, S. Dak.

Course in Forestry. The turning out of skilled foresters is no inconsiderable part of the valuable work of the Bureau of Forestry. No profession is so little crowded, and none offers a more inviting field to the conscientious and zealous student. That forestry, as a science essential to the well-being of the nation, is steadily growing in popular favor is evidenced by the increasing number of schools and professorships of forestry that are established. The latest professorship

is that at the agricultural college at Ames, Iowa, called the Iowa State College. To fill this position it has chosen Mr. Hugh P. Baker, of the Bureau of Forestry. Mr. Baker is a graduate of the Michigan Agricultural College and the Yale Forest School, and has had a wide experience in handling problems in forestry in the West. He will lecture at the college half of each year on general forestry in its application to Iowa conditions. The other half of the year he will devote to Bureau work, for the most part investigating forest problems as they concern the State of Iowa.

Opportunity for Woodlot Owners. Throughout the Northeastern States, from Massachusetts to Maryland, and as far west as Indiana, chestnut holds an important place as a timber tree. Commercially, it is chiefly in demand for ties, telegraph and telephone poles, and posts, for all of which purposes, as well as for some constructional uses, it is especially adapted by its peculiar power to resist decay in contact with the soil. It is also largely used for fuel and general farm purposes. In Maryland alone, according to the Twelfth Census, its annual market yield of lumber, railroad ties, and telegraph and telephone poles amounts to over $100,000, besides large supplies of material for local consumption.

It happens that chestnut is especially fitted for management in farmers' woodlots. Before scientific forestry began to be heard of in the United States, and when forest preservation was not uncommonly talked about as a sentimental fad, the thrifty owners of the small tracts of woodland which cover so much of southern New England, New York, Pennsylvania, and neighboring states had long been cutting successive crops of the hardwoods which sprout rapidly from the stump, thus practicing more or less rudely what the forester calls the "pure coppice" method of management. The superior market for chestnut, combined with its rapid growth, gave it, on the whole, the leading place in the esteem of these woodlot owners, who by winter cutting were able to turn to good account time for which farm occupations gave no other employment.

The results of a study recently conducted and soon to be published by the Bureau of Forestry show strikingly the advantages of chestnut for this kind of management, and at the same time suggest some very practical conclusions concerning how the methods now in vogue may be improved. Like other trees which reproduce by sprouting, chestnut loses its vigor when the root system becomes too old. Trees grown from seed increase, both in height and bulk, more slowly for many years than those grown as sprouts from the stump. But by the time the trees are from 80 to 100 years old the seedling trees will catch up, and eventually reach a larger size than the others. For ordinary uses, however, chestnut is cut long before this age is reached, and coppicing is therefore the best way to raise it. But unless new seedling growth starts in the forest along with the sprout growth, the declining vigor of the old root systems will result in smaller and smaller production until only a sickly stand of inferior timber is left to draw on.

Chestnut tends to produce seed abundantly, and if the nuts were left to sow themselves, the forest would take care of itself very well. But crows and squirrels and other animals levy a heavy toll. Far more formidable, however, in well-settled regions, are the gatherers of nuts for the market. With chestnuts selling at an average of $2.50 a bushel, there is a premium on the seed crop which makes propagation of the tree through this means a matter of dubious chance. When in addition the hogs are permitted to range the woods for mast, and cattle to browse the tender shoots as they rise from the ground, the prospect of seedling growth is small indeed.

Chestnut is not exacting in its soil requirements. Its roots spread comparatively deep, so that it is not so sensitive to fire or humus destruction from any cause as most species. Its sprouts grow so fast that a height of 7 or 8 feet at the end of the first season is not uncommon, and its stumps are so vigorous that one will often produce 40 to 50

sprouts. Not more than one in 8 or 10 of these will mature, but by selecting the most promising the full vigor of the parent stump may be concentrated on them to the great improvement of their rate of growth. The observations made by the Bureau have proved that low stumps produce more vigorous sprouts than high ones, and that winter or spring cutting is followed by better results than that done in the summer or fall. Telephone poles are grown in Maryland from healthy stumps in from 35 to 38 years, and ties may profitably be cut in about 29 years. Too early cutting of ties should be discouraged as wasteful in the long run. The practice of permitting contractors to cut unrestrictedly for a given sum is one which works much injury to the permanent productiveness of the woods.

Although the study of the Bureau of Forestry, already referred to, was confined to southern Maryland, many of its conclusions are applicable, with proper local modifications, to chestnut throughout its range. It is an illustration of the practical work which the Bureau is doing for the benefit of the mass of owners of small tracts of timberland, for whom the employment of the services of a forester is out of the question, but for whom the application of the knowledge furnished by scientific forestry is essential if they are to reap the full value of their holdings.

Power Development on Missouri. Mr. H. A. Storrs, Electrical Engineer of the Reclamation Service, is about to begin investigations for the purpose of determining the feasibility of a steam power and pumping system on the Missouri River near Bismarck, North Dakota. An abundant supply of lignite exists in that vicinity, and it is proposed, if feasible, to locate a central steam plant on the east bank of the Missouri River adjacent to a bed of lignite, this plant to generate electric power to be transmitted up and down the river to pumping plants placed at points most favorable for raising water to the top of the bluffs.

Preliminary surveys will be run back from the bluffs to determine the most advantageous arrangement of distributing canals and the existence of possible reservoir sites for storing water. The investigation will also include the determination of the quantity and quality of fuel available; the range of rise and fall of the river; amount of sand in the water; character of ground on which power and pumping plants would be built; the difficulties to be expected in building and maintaining a transmission line; climatic conditions; relative amounts of government and private lands; character of the soil and information as to the value and character of crops, transportation, etc.

An outline of the work is being carefully planned by Mr. Storrs from maps and other available data, so there will be no delay in the investigation after the party enters the field.

Bureau of Forestry Field Work. In addition to its force engaged in forest-reserve work, the Bureau of Forestry has this summer 116 skilled men in the field. Of these 68, scattered in 26 states, are studying commercial trees, making working plans for woodlots and forests, and gathering data invaluable for the proper management of wooded areas. The remaining 48 experts, divided among 10 other states, are studying means of replacing the forest on lands from which it has been denuded, making planting plans for tracts to be forested, and planting in the western forest reserves. The data they will gather will be worked over and condensed by the office force this winter, and put into shape for practical use. Reports from the field which are coming in daily show that the year is to be one of distinct achievement, and that the work is progressing everywhere with important advance in American forestry. These experts, in covering their various territories, are zealous missionaries in the cause they serve, for wherever their work carries them the purpose of forestry, its methods, and its incalculable importance to the general welfare are understood, appreciated, and applied as never before.

MR. HOMER HAMLIN,

WHO IS DOING NOTABLE WORK IN CONNECTION WITH THE YUMA RECLAMATION PROJECT.

MAKING the greatest possible use of the Colorado River is one of the huge undertakings of the United States Reclamation Service, and in this Mr. Hamlin is assuming much of the responsible work. He was born at Pine Island, Minn., August 27, 1864, and educated in the common schools and high school, later adding to the knowledge gained there by independent study. During the period 1887–1893 he was city engineer at San Diego, Cal., and until 1895 was engaged in a general engineering and surveying business in the same city. In 1894 he was made assistant to the United States engineers in their survey for fortifications on Point Loma and Coronado Beach, and in 1895 he was located at Los Angeles as a draftsman; also serving in the surveyor's office of Los Angeles county. In 1895 Mr. Hamlin was appointed to a position in the office of the city engineer, Los Angeles, and in 1897 served in the office of the county surveyor of that county, becoming in 1899 deputy city engineer of Los Angeles. In 1901 he joined the federal government, serving with the hydrographic and hydrologic investigations under the Geological Survey, and in 1902 continued this work. On January 1, 1903, Mr. Hamlin was appointed to the position of engineer in the Reclamation Service.

FORESTRY AT THE WORLD'S FAIR.

BY

ALFRED GASKILL.

THE great World's Fair now open at St. Louis affords an opportunity to measure the real progress that forestry has made in the United States within a decade. At the Chicago Fair, in 1893, a comparatively small building served to exhibit the country's forest interests and their relation to other subjects. The building devoted to the two departments of Forestry and Fish and Game at St. Louis covers 4.1 acres, and about 4 acres more are given to outdoor exhibits and demonstrations.

But too much is said of size at St. Louis. Quality does not always keep pace with it. This, however, is probably less true of the forestry department than of several others.

It is an old idea that forestry and game culture go together, and therefore not unnatural to find the two combined at the Fair. There is an advantage in it in that the animals, live or mounted, serve as attractions to many people, who incidentally get some knowledge of the forestry side; yet one wishes that irrigation and the interests of the farmers could be substituted for those of the hunters. The latter are often not hunters at all, but city people whose ideas of forests and forestry are chiefly of the sentimental or irresponsible kind. The hope of forestry rests more in enlisting the active interest of country people than in the enthusiasm of city dwellers. The concentration of effort that is possible in populous centers supplies a great initial force, but unless the movement reach those who are directly concerned, there is no real result.

Inside and around the Forestry, Fish and Game building are many interesting exhibits of animals—live, stuffed, or painted. Aquaria in the Missouri, Pennsylvania, and New Jersey sections show many kinds of fishes in salt and fresh water. Yet these things must be passed over; the visitor will be sure to see what he wants of them, for in many cases they are shown side by side with what more particularly belongs to forestry.

With some exceptions, the exhibits are made by states, the national and foreign governments, or by associations. Few individual exhibitors appear, unless it be as participators in state displays. This, of course, is regrettable, in that it limits the variety of products and processes that may be seen; it is a distinct advantage in lessening the purely commercial aspect of the show.

Some of the exhibits most worthy of note are the following:

EXHIBITS BY FOREIGN COUNTRIES.

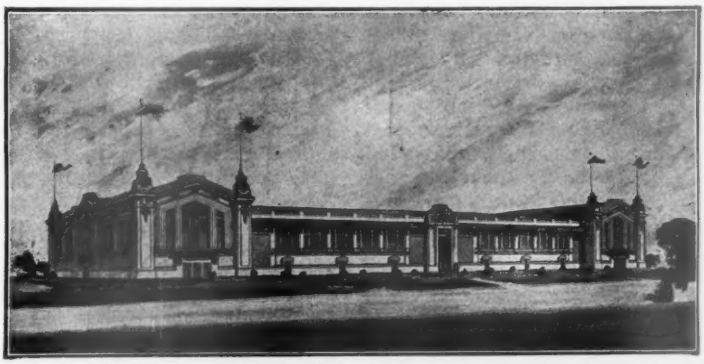
Germany.—In a pavilion, whose central space is occupied by a life-size bust of Emperor William in hunting costume, are shown, by means of pictures, maps, models, and tools, the technical side of forestry. The maps are copies of those used by the forest officers. The pictures show the character of the forests, and the labels on them explain what the management seeks and what it has attained. A model of a broad-leaf forest, with trees about 15 inches tall and ingeniously constructed of twigs and sponges, demonstrates the philosophy of thinnings. Various statistical charts also are interesting and the library of forest books. This exhibit is especially of Prussian forests, their problems and practices, and of the two Prussian forest schools, Eberswalde and Münden. It is the only distinctly technical exhibit made and is in every way worthy of careful study. The uniformed forester in charge speaks English and likes to answer questions.

Japan.—As in every department of the Fair, the new world power has an extensive exhibit in the forestry building, though a large part of it is devoted to

its fisheries. That the country is keenly alive to the need of looking after its forests is shown by a carefully prepared series of forest maps and a number of charts, all on German models, giving graphic information concerning the area, value, yield, etc., of the forest interests of the nation. A large number of fine specimens of commercial woods is also shown; each is carefully labeled with the scientific as well as the local names. In going over these samples one is struck with the considerable number of clear, soft, easy-working woods. If Japan were prepared to export these, she would have no difficulty in finding a market for them, but it is said that the available quantity of none is great.

Great Britain exhibits no forestry to speak of. A few photographs are interesting in showing the kind of timber that is esteemed there, and we who insist on clear, straight, white oak may learn something from the taste of the English that will profit our forests.

Canada.—The great rustic arch, which forms the chief feature of the Canadian



FOREST, FISH, AND GAME BUILDING, LOUISIANA PURCHASE EXPOSITION.

Perhaps the most interesting feature of the whole exhibit is a collection of bamboos—clear, straight, beautiful specimens—from the little knotty ones that are used for switch canes to poles 6 inches in diameter and 40 feet long.

France—makes only a small forestry exhibit; there are some fine specimens of cabinet woods, none of them native, and an interesting demonstration of quarter sawing on several sections of oak logs, but nothing of the French silviculture or forest management that one would like to see. A model of a city building with pole scaffolding such as is universally used in Europe presents a striking contrast between their and our ways of using wood. Such a scaffolding, the pieces all lashed, not nailed, together so that it can be taken down, may serve to put up a hundred buildings. A separate exhibit in the French section shows a fine collection of willow basket ware. It would be interesting to see more of this work, since an effort is now making to extend the industry in this country; but, so far as I know, this exhibit is the only one at the Fair.

exhibit, is an attractive piece of work; yet one wonders what it is for. The legend that it bears in letters of gold—

OVER THREE THOUSAND
VARIETIES OF WOOD
USED IN THIS RUSTIC WORK:
ALL GROWN IN CANADA

is false of course, and the statement is but little bettered when it is explained that most of the pieces are from fruit-tree stock, every nurseryman's variety counting one. The exhibit is really valuable in giving information relative to the Dominion's forest industries, the location and character of its timber lands, etc. These are set forth on placards and in an attractive booklet. In a separate building nearby are shown

some fine specimens of Canadian logs and lumber, and the only exhibit of pulp wood at the Fair. The Canadian species, of course, are the same as those found in our northern states.

Other Foreign Countries.—Mexico, Brazil, Venezuela, Argentina, Cuba, and some other countries make exhibits of woods, and sometimes of herbarium specimens, that are interesting botanically; yet, since no one goes to a Fair to study such things, their value is not apparent. It is well known that few tropical woods are commercially important, because they are unworkable or too widely scattered; consequently most of the specimens might as well have been left at home. One likes to see *Quebracho colorado*, the Argentina wood that is so rich in tannin, and to recognize in the really great Brazilian collection some of the more familiar cabinet woods, but it is impossible to go into details. The Portuguese exhibit of cork would be more interesting if it showed even a little of the methods employed in handling the cork bark. As it stands, it is out of place in the forestry building, being purely a manufacturer's exhibit.

PHILIPPINES.

In the Philippine concession a large building is devoted to the forest products of the islands. Much space is given to specimens of fruits, fibers, gums, etc., and though there are many fine samples of wood, one is a little disappointed in the collection as a whole, in view of the reports that have been published about the size and quality of Philippine timbers. The woods are characteristically tropical, most of them heavy, hard, and full of defects, and consequently of relatively little worth. The labels are good, and might well furnish suggestions to other exhibitors.

THE UNITED STATES.

Comparisons between the exhibits of the several states are inevitable, and if the task be undertaken here it is in an effort to point out what appear to be the deficiencies of some of them. An exhibit at an exposition is meant to instruct, and the extent to which it does that must be the measure of its success. The reader will bear in mind that what is here said refers to the forest exhibits only—not to the fish and game that often share the same space, nor to the attendants. In not a few cases information that the exhibit itself fails to give can be obtained from the capable men in charge.

Arkansas.—Two-thirds of the space allotted to the state that contains more hardwood than any other is filled with samples of short-leaf pine flooring, siding, etc., all varnished. There are specimens of nearly all the native woods, it is true, yet they represent very inadequately the actual quality of much of the lumber that is produced. A few white oak staves, ash oars and handles, and hickory wagon stock represent the very important industries in those lines. Several samples of turned ware in tupelo gum suggest many uses for that light, soft, clean, and much-despised wood.

California.—California's exhibit is a disappointment; not because it has been shown before, but because it does not truly present the real resources of the state. Redwood is dominant naturally, but in the inside exhibit it is shown chiefly as a cabinet wood, in burls and veneers or as freaks. The same is true of all the other woods. The specimens are fine without a doubt, but where is the sugar pine, the western yellow pine, the common lumber and shingles, and the information about them all that should be the state's chief care? Outside the building is shown a western yellow pine stem 145 feet long, 45 inches in diameter at the butt, and 28 inches in diameter at the top, necessarily cut into 9 logs to be brought hither, and a sugar pine log 8 by 14 feet.

Georgia.—The chief interest in this exhibit attaches to a collection of turpentine trees, tools, distilling apparatus, and products. The material is more complete than that of the Bureau of Forestry, though not so well arranged. There is also a good collection of wood specimens and some sample pieces of hardwood furniture, but neither give much of an idea of what the lumber resources of the state are. Of forestry there is no suggestion other than that

furnished by the distribution maps on a number of log specimens.

Kentucky.—This state has a very good exhibit of hardwood products. It is chiefly made up of samples from various industrial establishments arranged to show the special uses for which the more important woods are fit, and in this respect is interesting and valuable. The specimens are carefully labeled, though there is the usual confusion of common names.

Louisiana groups a good collection of wood specimens about a large-scale relief map of the state, colored to show in a broad way the character of the forests. Various wood products are also shown, but the exhibit lacks the definiteness in detail that is found in some others.

Michigan.—Here is an example of pretty good material made of little avail by faulty treatment. The exhibit is a collection of small photographs, placards, and wooden ware, jumbled up with some lumber specimens. There is information to be gained if one takes the trouble to hunt for it, but few are disposed to do that.

Mississippi.—The wealth of forests that is known to exist in this state is only suggested by the exhibit made. A considerable space is filled with wood specimens, but many of them are not even labeled, and one has difficulty in getting any information of practical value from what is shown.

Missouri.—The home state of the exposition is accorded the place of honor in the Forestry building and a space larger than that of any other. It is occupied by a series of rather heavy booths of various woods, and those in turn by wood specimens and manufactured products. The feature that no forester or lumberman will be apt to miss is a booth, about 20 feet square and 12 feet high, constructed entirely of red gum. The display proves the value of red gum for inside finish, disproves the common contention that it can not be seasoned and used in that way, and exhibits the fitness of the wood to take many stains and a fine polish.

New York.—The Empire State makes a great exhibit in an effort to show what forestry is. The central feature is an Adirondack log cabin, rather finely built and furnished, it must be admitted, yet showing well the attractiveness of woods life. The trees are represented by specimens of leaf, flower, and fruit and their woods by small pieces instead of by lumber forms. Outside the building about a quarter of an acre is occupied by a nursery designed to show how trees are raised and set out to renew the forest. The lumber industry is ignored entirely.

North Carolina. — The wonderfully fine collection of hardwood specimens seen at former exhibitions is here shown again. A clear black-walnut log four feet in diameter attracts much attention, as does a section of a tulip poplar tree five and one-half feet in diameter. These specimens all evidence the size and quality of the timber of the state, and stand in rather strong contrast to the gaudy furniture that is also displayed in the cabin built of pine slabs. In much of this furniture the chief aim seems to be to display the greatest amount of silver grain in what passes for quartered oak. The thing becomes ridiculous when oval drawer fronts and even cylindrical pillars and rails are made to exhibit the broad medullary markings. North Carolina is not the only offender in this respect. The whole display, though attractive in many ways, does not well represent the forest resources of the state, and nowhere does it even suggest the state's commanding position in the proposed Appalachian park and the interest its people are understood to have in that movement.

Oregon.—This exhibit is not so attractive as some, but in value it stands easily in the front rank. The indoor exhibit shows a number of unvarnished specimens of commercial lumber and a full collection of the woods of the state. Outside the building may be seen a stick of red fir 42 feet long and 4 feet square and a log of the same 9 by 30 feet.

Other features of the exhibit consist of samples of special manufactures—pine needle fiber, etc.—but most important of all is the collection of figures concerning the amount, kinds, and quality of timber in the state. It probably is true that

these figures are not entirely right, but they are collected and published in a laudable effort to give the kind of information that is worth something.

Tennessee.—This exhibit is almost without significance. A number of small wood samples make a show without telling anything, and some manufactured articles, cedar ware, etc., though good and representing important industries, are set up with nothing to indicate why they are shown. Tennessee could and should have done better. She can even yet remove a number of cross-sections of logs *with longitudinal grain.*

Texas.—Probably few people think of Texas as a timbered state. The exhibit here is emphatic evidence to the contrary. Two booths of longleaf pine, one in cabinet style, the other rustic, contain a fine show of that wood in commercial forms and a collection of wood specimens that, in variety and size, is not inferior to that from any other section. Unfortunately, there is no statistical or graphic information offered.

Virginia.—Virginia's interest in her forests is evidently less active than in her fisheries and oyster beds. There are some good specimens of lumber shown and a few forest pictures, yet one finds no reference to the many bodies of thrifty young timber that the state contains—growths made since the civil war—nor to the locations of mature timber, the facilities for logging, etc.

Washington.—The great forests of Washington are inadequately represented. The outer wood and bark from the butt of a red fir tree 15 feet in diameter is set up to form a room and is an attraction to many visitors, and some large planks of red fir, giant cedar, and sitka spruce show the size and quality of Washington lumber, but the extent of the forests and their economic value are nowhere shown save in a pamphlet with fine pictures and not much information.

The Washington state building is, however, a demonstration in red fir and deserves a visit on that account.

Wisconsin makes her chief exhibit of large white pine framing timbers. The booth is attractive, yet one is bound to reflect that white pine never was a structural wood, and large pieces are now too rare to be worked into such forms except for a purpose like this. As a display of the former importance of white pine, the exhibit has considerable interest. Copies of a notice posted throughout the state evidence the activity of the forester and the desire of the people to protect and maintain the forests that are left.

Several other states make exhibits of forest products, or of work done in behalf of forestry, yet they do not deserve special mention. Far more significant is the failure of such leading states in the forestry movement as Pennsylvania, Maine, and Minnesota to show what they have done to maintain and extend their woodlands.

BUREAU OF FORESTRY.

This exhibit deserves to be studied. There is plan and purpose in it, and each feature is meant to show some part of the work in which the national government is engaged.

Inside an arcade 88 feet long and 16 feet wide, with no light but that which comes through the pictures, is displayed a great collection of photographic transparencies illustrating the forests and forest problems of the United States. One wall is devoted to the eastern half of the country, the other to the western, and the individual pictures are often so arranged that it is possible to compare conditions in the east with those in the west. The series as a whole illustrates every type of natural forest and many situations that have been modified by the skill of the forester.

Supplementing this set of pictures is a series of enlarged photographs painted in the natural colors and framed in the balustrade that encloses the exhibit space. Some of these pictures are ten feet long and give wonderful panoramic views of several forest regions. The best is probably that of Grandfather Mountain, the central feature of the proposed Appalachian Reserve. It is unfortunate that the pictures are set too low to attract general attention.

But this exhibit is not all pictures. A large case contains a set of long-leaf pine trunks showing every stage of the process of collecting the resin from which turpentine and rosin are derived,

and contrasting the old method of boxing with the new, in which cups and gutters are used. In another section the operation of timber testing is shown by a 100,000-pound testing machine, and its results by a number of beams and smaller pieces and by a series of charts and diagrams. On a relief map of the United States are shown many important facts relating to forests and forestry, and other maps give sundry kinds of information. Another important feature is the outdoor exhibit of forest planting, in which about three acres are devoted to demonstrations of how and what to plant in any section of the country. Other outside exhibits are those of practical timber-testing and wood-preserving, which are carried on daily in that part of the grounds known as "The Gulch," more than a mile from the Forestry building.

YELLOW PINE EXHIBIT.

The exhibit of the Southern Lumber Manufacturers' Association deserves special mention, because it is the only display made by a lumbermen's organization, and because it shows what a given kind of wood is good for. In the exhibit no distinction is made between long-leaf and short-leaf pine, yet the manufacturers and dealers recognize the peculiar qualities of each and furnish what is wanted.

The chief object in the exhibit is a cottage built throughout of yellow pine, stained in attractive colors outside and treated as a cabinet wood within. Each of the three rooms has a different treatment, and all are notably attractive. A car-load of short-leaf pine logs is another feature, and a series of stock samples includes the ordinary commercial grades of yellow pine. This last is especially interesting, because it is the only collection that shows anything but selected specimens.

HOO-HOO.

The building that the lumbermen's organization has erected must not be overlooked, since besides being a clubhouse it contains a series of rooms that afford a practical demonstration of the value of redwood, cypress, red gum, and several other commercial woods for inside finish. The building was unfortunately burned down in June, and though the energy of the members restored it in less than a month, it was impossible to reproduce the original beauty of many of the rooms.

SUMMARY.

The features of the exposition that have been referred to in detail may be summed up under three heads—attractiveness, educational value, commercial value.

In general the first is satisfactory, the second and third less so. In any exhibit an object without a label to tell what it is and what it is for is a nuisance. Many collections are full of nuisances. Again, the exhibit that shows specimens without indicating their relative quantitative and qualitative importance does little to enlighten the visitor. In the Texas exhibit, for instance, are specimens of bald cypress and red willow, both of about the same size, yet with nothing to suggest that the one has little more than a botanical value, while the other is one of the most important lumber woods.

Another fault is the too general use of varnish. It is employed often in the interest of neatness, it is true; yet in several exhibits the specimens look well without it and far more natural.

The criticisms here made, whether of individual exhibits or of all together, are to be viewed in the light of an effort to measure the display by a high standard. As a whole, the forestry exhibit is creditable and highly instructive; yet in four directions it falls short of what it should be:

First. The motto of the exposition, "Processes, not products," is negatived by the signal failure to have exhibited a complete set of up-to-date logging and wood-working tools and machinery. There are some stave saws, coopers' tools, and hand tools in the Forestry building, and some barrel and box machinery, a portable sawmill and some planing machines, etc., in the Machinery building; but the lumberman will look in vain for a donkey engine, a complete band mill, or a steam skidder.

Second. Except in the yellow pine exhibit, there is nowhere to be found a set of specimens illustrating lumber grades. Each exhibitor shows the best, or better than the best in a commercial scale, and the great opportunity to compare gradings in different woods and in different parts of the country is lost.

Third. An excellent opportunity to make a comparative study of woods is almost lost through the failure of exhibitors to properly label their specimens.

The confusion in common names is hopeless, and something might have been gained through an effort on the part of the management to have each specimen properly identified and marked.

Fourth. Forestry as a science or art—the means by which timber lands are maintained and improved or forests created—is a name only outside the spaces allotted to Germany, Japan, the United States Bureau of Forestry, and the State of New York. Yale is the only forest school that attempts an exhibit, and that is so trifling, a map and a few pictures, that nothing were better.

But if the growth of forestry seems limited by certain defects or shortcomings in the exhibits made, the Fair itself proves the contrary. People from all parts of the country seek the Forestry building, ask for information, are disappointed that certain things are not done, and in many ways evince the liveliest interest in the new movement. There are plenty of dim ideas about what is to be done, there is still more than enough of sentimental enthusiasm; but indifference has ceased and the active opposition maintained by a few interests is giving way as the aims of forestry become understood. It is the deliberate judgment of one who has had an exceptional opportunity to learn the minds of many people that the progress made in forestry within the past 10 years is real, that it is immense, and that it will continue.

SOUTHERN FLORIDA.*

NOTES ON THE FOREST CONDITIONS OF THE SOUTHERNMOST PART OF THIS REMARKABLE PENINSULA.

BY

DR. JOHN GIFFORD.

ACCORDING to the report of the Biological Survey of the U. S. Department of Agriculture, there are three regions in the United States which belong to the Tropical Zone.

One is in southern Texas close to the mouth of the Rio Grande, another is along the Colorado River in Arizona and California, and the other is southern Florida.

The first two are hot and arid, the other is humid and pleasant throughout the major portion of the year. The southernmost part of Florida can rightfully claim, therefore, the distinction of being the only humid or truly tropical part of the mainland of the United States—the only tropical part of this country which can be reached by rail. The lines called the tropics of Capricorn and Cancer, although of course perfectly straight on the map, are really very crooked and very dificult to definitely locate. Some claim that the frost line is the limit; if this is so no part of Florida is in the tropics, since frost has occurred, in spots at least, throughout the whole peninsula. The best guide is the character of the vegetation, and wherever the cocoanut, avocado, mango, pineapple, and hundreds of other strictly or characteristically tropical plants flour-

* The illustrations accompanying this article are reproduced here from an article by Dr. N. L. Britton on "Explorations in Florida and the Bahamas" in the July number of the *Journal of the New York Botanical Garden*, through the courtesy of its editor, Dr. MacDougal.

ROAD THROUGH ADDISON HAMMOCK, CUTLER, FLORIDA.

ROOTS OF MANGROVE (*Rhizophora mangle*), SHORE OF BISCAYNE BAY, MIAMI, FLORIDA.

ish, and fruit without protection, the region is truly tropical.

The territory referred to in this article is unique in another respect. It is the only region of coral formation in the United States. These two peculiarities combine to render it a region of extreme interest to foresters and botanists. Here is field for research for many years to come, where many phases of plant ecology may be studied to better advantage than elsewhere on the continent. One can pass through all the climatic zones from the Boreal to the Tropical in going from the region of the proposed Appalachian Park to Biscayne Bay in a little more than twenty-four hours. Were the roads all good, it would be little more than a pleasant automobile trip.

The part of Florida to which this article refers lies between the Everglades and the Florida Strait, and includes the territory around Miami, and southward to Cape Sable, including many coral keys, mangrove islands, and wooded islands in the Everglades.

The vegetation of this district from a forestry standpoint may be divided into three distinct types—the hammock, the pineland, and the mangrove swamp. It is, of course, impossible in so short a space to give more than a superficial description of these types.

The hammock is undoubtedly the climax forest. It represents the type that the rest would in time become were it not for fire, flood, and other detrimental and retarding influences.

The hammock is a tropical jungle, consisting of species of trees characteristic of the Antillean flora. Most of these species produce a vigorous coppice, and the ground is covered with a rich black mold resulting from the leaves and detritus of these hardwoods. It is in the hammock where one finds mastic, crabwood, satin-leaf, gumbo-limbo, princewood, whitewood, manchincet, and many other rare and in many instances valuable woods.

This hammock may be found in patches in the pineland, on islands in the Everglades, on the keys north of Bahia Honda. Strange to say, the southernmost keys are like the pineland of the mainland in character. Sand Key, seven miles to the south-southwest of Key West, is the southernmost point in the United States. Although all the keys north of Bahia Honda were once covered with a dense tropical growth, much of it has been cut for pineapple clearings. In many places, especially in Key Largo, it is still in virgin condition. Wherever these keys are above tide water, the growth is hammock; when subject to overflow, it is mangrove swamp. Some keys are all hammock; others are all mangrove, and others have hammock centers fringed with mangrove.

For half a century the timber on these keys has been cut, allowed to dry, and is then burnt. In the ashes a fine crop is produced, and fertilizers have never been used. The fact that pineapple patches are very combustible has caused these natives to burn cautiously. In referring to the vegetation of these keys, I cannot refrain from quoting the following from an article by the botanist Curtiss in ' Garden and Forest,'' volume I, page 279:

"A person who is acquainted only with the vegetation of more northern states, or with that of northern Florida in traversing these keys, will find scarcely a tree or herb identical with, or even resembling those with which he has been acquainted. He may hear familiar names in use by the inhabitants, such as cherry, mulberry, and cedar, but on examination he will find the species thus designated to be entirely different from those which he has known by such names before. The curiosity is piqued at every step by some unfamiliar and interesting form of vegetation, and if the tourist be accompanied by one of the inhabitants he will learn much of the popular lore regarding names and uses, for these people are remarkably intelligent in regard to the vegetable and animal life of the region they inhabit. It will be found that almost all the adult inhabitants come from the Bahamas, that nearly all the trees and other plants are common to those islands, and, in short, that these islands have much more in common with the Lesser Antilles than with the Florida mainland.

BROMELIADS ON THE LIVE OAK, MIAMI, FLORIDA.

THE SOLITARY REMAINING INDIVIDUAL OF SARGENT'S PALM (*Pseudophœnix Sargentii*), ON ELLIOTT'S KEY, FLORIDA.

"A tour of the Florida Keys reveals nature and society under such peculiar conditions that any one who has never visited this insular region may rest assured that there remains in store for him at least one source of novel and enjoyable experience, though he may have traversed the mainland of the United States from Maine to California. As regards conformation and soil, the inhabitants and their pursuits, the surrounding waters and the marine life they support, these coral islands differ essentially from all other portions of our vast country; but in no particular do they present so striking a dissimilarity as in the vegetation which covers them."

In spite of the mosquitoes these keys are charming places, especially Elliott's, which is bounded on one side by the waters of Biscayne Bay and on the other by the straits of Florida. They are protected from storms by a chain of coral reefs. Near at hand are the famous Sea Gardens.

The pineland, although less rich and luxuriant in growth, is also peculiarly interesting. The rocky ridges or reefs, with sandy swales in between, are covered with pine and palmetto. The pine, strange to say, seems to shun the sandy swales. The sand of these swales is underlain usually with a reddish calcareous clay, resulting from the disintegration of the coral rock. This rock may be found in all stages of disintegration. In the swales the palmetto is most luxuriant, and no doubt the absence of the pines in these places is due to this fact. The regeneration of these pines, in spite of fire and rock, is generally good. The pines grow right in the rock, the roots penetrate its crevices, and the tree is anchored to such extent that when it upturns the rock upturns with it.

I am not certain that the rock of the mainland is what a geologist would call coral. On the keys the soil is certainly solid coral, crumbled coral, and coral sand. On the mainland it is a limestone as soft in places as chalk and as hard in others as flint. In places it seems stratified or in plates and lifts out in good flat building stones, which harden on exposure; in others it is jagged, honeycombed, and filled with pot-holes and pockets; in others it is coquina-like in character, and in others has a *volitic* structure.

The pine is Cuban pine (*Pinus heterophylla*), peculiar to that region. It does not yield resin satisfactorily, and is therefore not tapped. It is so heavy that it sinks in water, and on the whole is one of the meanest woods on earth to work with. The heart or light wood is durable, but it warps to such extent and is so hard when dry that it is cut, hauled to the mill, sawn into boards, and used for constructive purposes just as soon as possible.

It is almost impossible to drive a nail into the dry wood without splitting it, and in order to saw it one must flood the tools with kerosene to prevent gumming. Lumber merchants shun it, although many people use it because of its cheapness. The sapwood soon rots and leaves a heavy, durable heart, which would be in great demand for posts, ties, poles, &c., were it not so plentiful. Much of it is used in burning the coral rock into lime, and much of it is burnt up in the clearing simply to get rid of it. The "log-rolling" stage is still on in this district. In many cases it is blasted down with dynamite and then burnt; in others it is "deadened" and then burnt standing. It would probably pay to distill this wood, since it could be secured cheaply and would yield large quantities of tar. The palmettos are being used for the manufacture of tanning extract in Miami. If a factory is established which will convert this wood, including stumps, into tar, there would be little left on this rocky ridge in the way of a cover.

Fire sweeps over these pine regions frequently. The pine needles, grass, and palmettos burn like tinder. The dry pine bark and rotten sapwood hold fire like punk. Fire gets down in the crevices of the rock, so that it is next to impossible to extinguish it. The effect of fire on this rock is peculiar. It becomes a potent geological agent. It converts the rock into lime, which slakes when wet by rain or dew. In burning piles of brush, rocks are often

PINE (*Pinus Elliottii*) AND SCRUB PALMETTO (*Serenoa serrulata*) ASSOCIATION, NEAR CUTLER, FLORIDA.

BORDER OF THE EVERGLADES WEST OF CUTLER, FLORIDA; A "PRAIRIE" IN THE BACKGROUND.

thrown into the heap to check the flames or prevent the wind from blowing sparks. These rocks are burnt with the wood and crumble into soil.

This rock crumbles into soil in the presence of decomposing organic matter. By the use of velvet beans, dynamite, and hard grubbing by Bahaman darkies, the roughest, most hopeless looking rock-bed may be converted into productive soil.

There ought to be considerable nitrogen present in this soil, since the ground is often covered with thirty or more species of creeping legumes. There must be potash somewhere, since the palmetto ash is extremely rich. Few things will grow, however, in this rock without the help of fertilizer. Plant-food materials may be there, but they are not available. The rock is usually wet, even in the driest times. In fact, under this coral ridge there are channels of water running from the Everglades and bubbling out in the form of crystal springs along the shores of Biscayne Bay.

All this pineland would in time become hammock, no doubt, were it not for forest fires. One can find all stages between the true hammock type and the pineland. Where pineland has been protected from fire, it becomes hammock-like in character.

The type of forest called mangrove consists in places of pure red mangrove, the great land-former, but gradually merges into forest similar to hammock. The vegetation of the mangrove swamp consists of those species which can stand a salt-water bath occasionally. They are located on muck lands which are being gradually wrested from the sea. The red mangrove is chief among those plants which can thrive in salt water. With it, however, are often associated the cocoanut, the seeds of which float in, become covered with wet seaweed, and then sprout and grow together with buttonwood, black mangrove, sea grape, and others. There are hundreds of thousands of acres of land in which mangrove predominates. Fringing these muck lands are often sand beaches. In the course of time, when this land becomes high and dry by the continued deposit of vegetable detritus, other trees, such as grow in the hammock, gain a foothold and spread.

Back of this rock ridge, which stretches along the coast from the region of Miami southward, is that vast territory called the Everglades. In the Everglades there are hammock islands, on some of which the Seminole Indians live. This Everglade region, it is claimed, contains 3,760,000 acres. Since ten acres is sufficient for the support of a family in that climate, there is room for 376,000 families. The whole cultivated area of Florida is estimated at 1,000,000 acres. It is interesting to compare the size of this wild territory with other parts of the world. For instance, the Everglades cover 5,875 square miles; Porto Rico, 3,550 square miles; Rhode Island, 1,250 square miles; Delaware, 2,050 square miles; Jamaica, 4,207 square miles. When this area is once properly reclaimed there will be little of it which can not be cultivated. The complete drainage of these Everglades is not only being seriously considered, but is actually in progress. The following on the "Draining of the Everglades" is from a recent issue of *Success*, by J. E. Ingraham, one of the vice-presidents of the Florida East Coast Railroad:

"There are great agricultural possibilities in the Florida Everglades. Though they are yet merely an expansive waste of swamp and lake and jungle, I venture to predict that they will be the location of hundreds of fertile farms within ten years, and will by degrees develop into one of the most productive tracts of land in the world. The barrier to the utilization of the Everglades has been, of course, the water which covers the greater part of them to a depth of from one to six feet; but it has been found entirely practicable to drain off the water. Work to this end has already been begun and is being pushed rapidly. When it is completed a tract of land one hundred and sixty miles long and sixty wide will have been opened to cultivation. The size of this region is not as important as the remarkable productivity of the soil. The latter is not only absolutely virgin,

but has been fertilized by animal and vegetable life through many centuries. I am confident that its crops will lift Florida to a place among the leading agricultural states.

"The project of draining the Everglades attracted the attention of Henry B. Plant in the early nineties, but he was by no means sure that the scheme was feasible, so I, acting under his direction, undertook an expedition through the region. Despite its proximity to centers of population, it was then for the first time thoroughly explored by white men. Ours was virtually a voyage of discovery. We paddled our light boats on lakes and camped on islands that, I have good reason to believe, had never before been visited by any human being but Seminole Indians, and by these but rarely. We underwent so many hardships that some of our party were compelled to turn back, but our efforts were not in vain, for we ascertained the important fact that the Everglades, along the whole 160 miles of the eastern side, are rimmed by a rock ledge. We furthermore learned that all of the lakes are several feet above sea-level, and we decided that there was nothing whatever to prevent the water of the lakes from flowing into the ocean and leaving the land drained if vents could be made in this long ledge of rock. The chief question before us pertained to the practicability of cutting through the ledge in various places, and dredging out outlets into the Atlantic, which is not more than 2 or 3 miles away at numerous points.

"Experiment proved that this work would present no great difficulties. It was merely a matter of a great deal of digging. Henry M. Flagler took up the project, and it is being carried out by his lieutenants. We are not only making artificial outlets through the rock, but are also, by ditching and dredging, turning large bodies of water into rivers and creeks which flow to the ocean. The work has progressed far enough to enable me to predict confidently the opening in Florida, within a very few years, of a great tract of land of almost unprecedented fertility."

When one considers what the Bermudas yield, with only twenty square miles of rocky land, the possibilities of this great southern tropical peninsula seem almost limitless. The whole region is one of great interest, and although one of the first to be explored and partly settled it has remained dormant until lately. Settlement is difficult, but gradually obstacles are being overcome, and when competition in transportation facilities develops, the boom will be on in earnest.

This region of perpetual summer is the natural gateway to the West Indies, and the great peninsula of Florida, like a huge finger, directs the way to fertile regions beyond, awaiting American capital and enterprise.

THE IMPERIAL VALLEY OF CALIFORNIA.

A SPOT WHERE A REMARKABLE DEVELOPMENT HAS TAKEN PLACE AND A GREAT FUTURE SEEMS ASSURED.

BY

GEORGE BELLIS.

IN the southwest corner of the United States, where flows the mighty Colorado River of the West, and near the international boundary line between the United States and Mexico, there has grown up within the last four years an important enterprise in the way of the reclamation of arid America by means of irrigation.

With irrigation facilities in the Imperial Valley, a failure of the crop is an impossibility where the crop is intelligently irrigated.

The "Imperial country," as it is lo-

FIELD OF MILO MAIZE IN IMPERIAL VALLEY.

cally called, has come to be known as one of the most important and notable settlements ever planted—not only in America, but in the civilized world.

The writer has just returned from a visit of inspection to the valley, and will attempt to tell in a conservative and just way what he saw and learned of the agricultural development of the country. His information as to crops, etc., was gathered, for the most part, from farmers he met and talked with as a mere visitor to the valley and not as a newspaper correspondent.

The Imperial Valley is located in the great Colorado Desert and comprises about 500,000 acres of fertile land—a veritable desert without water, but a fruitful garden with irrigation.

The first water for irrigation was delivered at Imperial in June, 1901, and in the short space of time required for the realization and development of this unique experiment it is conservatively estimated that 70,000 acres are already under cultivation. Upon these desert lands when supplied with water are grown, in lavish abundance, a variety of crops, among which are the following: grains, millet, Egyptian corn, alfalfa, and sorghum; and live stock: cattle, hogs, horses, and other animals.

FLOODING SCENE NEAR IMPERIAL.

Sugar beets, sugar cane, cotton, and tobacco can doubtless be produced here successfully, and other products of the soil would thrive and produce in greater abundance than on irrigated lands elsewhere in California.

The writer found wheat and barley to be the principal crops at present. These are taken from the ground in the early summer, and the ground is again planted to maize, sorghum, or millet, all of which will make good crops before the close of the season.

The average yield of grain in the valley is very high, and that of wheat is said to be forty bushels to the acre, while barley is said to yield as much as fifty bushels per acre, and the writer was informed by growers that they found a ready market for both of these crops in California and Arizona. The annual yield of wheat and barley has been from $25 to $30 to the acre, to say nothing of the second crop which these lands will produce.

Alfalfa is also one of the great crops of the valley, and I was surprised to find so small an acreage devoted to this great Western crop, when I learned from those raising it that the returns were so large. Alfalfa is here cut from four to eight times a year, and a reasonable estimate is from one to two tons of cured hay per acre at each cutting. A field yielding six cuttings per year and one and a half tons at each cutting means nine tons annually. This alfalfa hay has a ready sale at from $9 to $12 per ton.

The writer is of the opinion that this is destined to become a fruit country also, as all kinds of fruit grown here will ripen several weeks in advance of the same varieties grown in the coast valleys of southern California, and hence good prices and ready markets will be obtained for this class of products.

Grapes will undoubtedly do well here, as the writer saw one vineyard of seedless Sultanas which was said to have been planted in the spring of 1902, and was in first-class condition and bearing.

The date palm will undoubtedly thrive better here than elsewhere in the United States, and Professor Swingle, of the United States Department of Agriculture, is the authority for the statement that the "Deglet Noor," the celebrated dessert date that retails in this country for fifty cents a pound, will prove a paying venture in the Imperial Valley. The government has already established an experimental farm at Heber, California, about ten miles south of the town of Imperial.

TWO YEARS AND FOUR MONTHS PRIOR TO TAKING THIS PHOTO THERE WAS NEITHER WATER, TREE, NOR MAN AT THIS POINT.

Sugar beets and rice have both been grown in an experimental way and are found to grow successfully, while early vegetables grown here will practically have the whole United States for a market.

The valley is reached by the Imperial Branch of the Southern Pacific Railroad, which was built in from Old Beach on the main line to handle the freight and passenger traffic of the valley.

ON THE INTERNATIONAL BOUNDARY LINE BETWEEN CALIFORNIA AND MEXICO.

The towns of Heber, Imperial, Brawley, Calexico, Silsbee, and Holtville have sprung up, magic-like, upon the desert and are making much progress. Mr. Willis George Emerson, of the Emerson Realty Company, is president of all six town companies.

The incorporated town of Imperial is the oldest and largest, having been started in 1901. It is on the Imperial Branch of the Southern Pacific, and has a population of about seven hundred, a national bank, ice and electric light plants; is connected with Old Beach by telephone and telegraph, and with the towns of the valley by telephone. It has two weekly papers—*The Imperial Standard* and *The Imperial Press*, a two-story brick hotel, a large grain warehouse, a creamery, and a piped water system. The Holtville Inter-Urban Railway Company has about completed an electric line which will run between Imperial and Holtville, a distance of about twelve miles.

Brawley, the second town of importance, is located on the railroad, 9 miles north of Imperial, and has many business houses already established and many more in the course of construction. This town is in the midst of the most fertile land in the valley and is rapidly building up. It has a progressive weekly newspaper, *The Imperial Valley News*, and a bank.

Calexico is at present the terminus of the branch of the Southern Pacific and is on the United States side of the boundary line. Mexicali is a town site laid out on on the Mexican side of the line. The Southern Pacific is now extending its line from Calexico to Yuma, and the future route of the tourist over this line will be via the Imperial Valley. There are two advantages that will be enjoyed on this new route when it is completed, the tourist will have the opportunity of seeing the great "Imperial country," and will go from Calexico to Yuma over the delta lands of the Colorado instead of over the desert, as at present.

Holtville promises to become one of the leading towns of the valley, and will have the electric power plant of the Holtville Inter-Urban Railway Company, where will be developed a 2,000

DATES GROWN IN THE IMPERIAL VALLEY.

GRAIN STACKED UP FOR SHIPMENT AT IMPERIAL.

FLUME OVER NEW RIVER.

MAIN CANAL, IMPERIAL WATER CO., NO. I.

HARVESTER AND THRESHER IN IMPERIAL GRAIN FIELDS.

ALFALFA—SIX MONTHS' GROWTH IN THE IMPERIAL VALLEY—TEN FEET IN HEIGHT—THE FARMERS' MORTGAGE-LIFTER.

COTTAGE IN IMPERIAL.

horse-power by a drop of water some 40 feet.

The writer takes great pleasure in predicting continued success and progress for the valley, and feels sure that the present canal system, upon which the welfare of the valley depends, will in the near future be improved and extended.

FORESTRY ON EDWARDS PLATEAU.

HOW IT WILL GREATLY BENEFIT A VAST AGRICULTURAL SECTION OF LOWER TEXAS.

THE topography of Texas is such that a vast body of its agricultural lands can be regularly supplied with a large amount of water without employing expensive irrigation systems which are so commonly required in many Western States. Texas is provided in the Edwards Plateau with a vast rain catchment basin, which has an area of some 15,000 square miles, covering 11 whole counties and the half of 13 others in central and western Texas. Its southern boundary is a line of cliffs in the hill region, extending from Austin to San Antonio and on to Del Rio. It stretches northward from the Colorado River beyond the granite region and into the timbered portion of the Grand Prairie. An elevation at Austin of 400 feet above the coast plain increases to 2,400 feet above sea level in its northwestern extension. The rainfall over this large territory is yielded up to the plains below through a number of rivers and a chain of superb springs issuing from the base of the escarpment which marks the plateau's southern boundary.

Dependent on the water supply of this plateau is a great stretch of the most fertile lands of Texas contained in the Rio Grande and Coast plains. These lands are in a semi-arid region and have not been fully productive because of insufficient moisture, which is due to the fact that half of the rainfall of the plateau is wasted in destructive floods. The problem is to abate these floods,

CEDAR BREAK NEAR AUSTIN WHICH HAS GROWN UP AFTER A CLEARING TWENTY-FIVE YEARS AGO.

THICK GROWTH OF SMALL MOUNTAIN OAK ON THE SIDE OF A DEEP GORGE IN THE EDWARDS PLATEAU COUNTRY NEAR AUSTIN.

store away the water, and supply it gradually throughout the year to the farm lands below. It is believed that the application of forest management to the Edwards Plateau will do very much to accomplish this important result.

The peculiar structure of the plateau fits it to absorb and store up water. It is a limestone country with tilting strata and extensive systems of fissures and caverns. To these are due the copious springs that issue from the earth far away at the southern boundary of the plateau. The present forest cover is by no means continuous, even in the rougher sections, but is broken into by open, grassy uplands. In the canyons a heavy timber growth is found, but the principal forests are those of the hills and bluffs. These are composed of variously mixed stands of timber. The cedar brakes are very dense and contain a good proportion of heavy timber, while the tree growth of the "shinneries" and of the "hardscrabble" country is stunted and found on the uplands. The mountain oak is a specially valuable species to the plateau, for it thrives in thickets on slopes of low gradient and on the hard limestone of gorges. The forests of the hills and bluffs are the most extensive, but with the exception of the heavier growth of cedar the wood is valuable chiefly for fuel. Clearing for farm lands, cutting for fuel, and forest fires have made great inroads upon these woodlands. An important and encouraging fact is, however, that all the hill species are characteristically rapid in recovering denuded ground. Further, it is characteristic of the scrub oak to encroach upon the prairie and of mountain cedar to capture adobe slopes. Thus in the very parts of the plateau where conservative forestry should be applied to create a protective forest are found the most desirable tree species and topographic conditions most favorable to the work.

While the structure of the plateau is admirably suited to absorbing water, its rough, eroded and rocky condition also favors a rapid run-off. The imperative need is, therefore, a means of retarding the flow of the water until the soil has a chance to drink it up. The best means of affecting this is through a forest cover, which assists in many ways the accumulation of a reserve water supply. The

crowns of the trees break the force of the rain, making it reach the ground more slowly and giving it longer time to soak into the earth. The litter of the forest absorbs water and retards its run-off, thus not only preventing erosion, but giving the water further time to filter into the soil. The roots of the trees bind the earth together and help to prevent erosion. Finally, the shade of the tree canopy cuts off the rays of the sun, prevents intense heating of the rocks, and very materially lessens evaporation from the forest-covered area. This is an exceedingly important matter in a section of the country where the dry air can annually remove by evaporation over 50 inches of free water. Thus it is clear that a forest cover would not only prevent the erosion which is constantly making conditions worse, but it would also hold in check vast quantities of water which now run off in destructive floods, and assist in storing it for future gradual use in river and spring flow throughout the year.

The chief industry of the Edwards Plateau is cattle-raising. If the ranchmen there do not over-pasture their lands, but preserve a good grass cover, and if even the present forest areas are maintained, conditions may not grow rapidly worse for the plateau and the lowland agricultural section. Both these precautions are, however, not likely to be observed. Moreover, it is necessary not only to maintain the present forest cover, but all dry hills and rough breaks should be put under forest. As such work would not pay for itself directly, and as it must contemplate the advantage rather of the distant farmer than of the neighboring ranchman, it will never be done by private means. It is distinctly a work for the State of Texas operating under a broad policy to build up its agricultural interests.

CHARACTERISTIC VIEW OF THE TIMBER, MOSTLY MOUNTAIN CEDAR, ON THE EDWARDS PLATEAU, 20 MILES NORTHWEST OF AUSTIN.

The Bureau of Forestry, through Prof. William L. Bray, has just completed a careful study of "The Timber of the Edwards Plateau; Its Relation to Climate, Water Supply, and Soil," and a bulletin dealing with the results, which are so vitally important to Texas, will be issued by the Bureau at an early date.

FOREST CONDITIONS IN WESTERN WISCONSIN.

BY

DR. L. H. PAMMEL,

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WESTERN Wisconsin was once a heavily timbered section of the state, consisting of hardwoods and conifers. The region embraced in this article contains the following tributaries of the Mississippi: the Black and La Crosse rivers, and also the Kickapoo, which flows into the Wisconsin, the latter finding its way into the Mississippi below Prairie du Chien. The territory in this section of Wisconsin immediately contiguous to the Mississippi River is intersected by many smaller creeks. The valleys here have in a large part been cleared of their timber and converted into farms. There is comparatively little level land in the smaller valleys, but in the larger ones there is a greater proportion of land suitable for agricultural purposes. The soil in these valleys consists largely of a yellow loam, originally with a few inches of humus. The bottom lands consist of an alluvial material of greater fertility. Near the shore lines of the present flood plain of the larger streams there are considerable expanses of a light, sandy soil. The flood plain of the Mississippi, La Crosse, and Black rivers consists of a few inches of surface drift underlaid with sand. The amount of sand and drift, however, is variable in the smaller streams.

The region alluded to in this article is included mainly in the driftless area. During the Cambrian age there was a great accumulation of sandstone, and great deposits of this material may be seen as outcrops along the Mississippi River, but further in the interior, along the Kickapoo, the valleys are narrow and the sandstone outcrops are less conspicuous. The hills are not so high and the valleys are narrower. Overtopping the sandstone is a layer of magnesian limestone, varying in thickness from 30 to 70 feet. The soil overlying the limestone consists of a yellow clay mixed with humus on the surface. The soil has had an important influence in the growth and kind of forest trees occurring in the region.

EARLY HISTORY.

During the early days timber covered all of the valleys and hillsides except the dry upper slopes, and was uniformly thick on the north slopes. On the east slopes the timber was thinner, owing to frequent fires; consequently this timber was of poor quality. The north slope consisted mainly of red oak, white oak, hickory, basswood, and birch. Beginning along in the late 50's till in late 70's, much of the timber of the lower fertile slopes was removed and the land brought under cultivation. This land produced splendid crops of wheat, so long as the humus remained in the soil. After the removal of the humus by washing, the soil no longer produced remunerative crops, and it became necessary to change from the cultivation of grain to that of grass, largely because of the washings.

Later, clearings were started on the ridges. These contained a heavy growth of white and red oak, some hickory and basswood. The wood could not be sold, and in clearing the farmers cut the trees and burned them. Later wood was more in demand, when it was cut into ties or sold as cordwood. In the 80's good red oak or white oak ties sold from 18 to 25 cents, the best white and red oak wood from $2.50 to $3.00 a cord. The grain were the chief crops on these denuded lands. As a result of the removal of the timber and cultivation of the slopes, great gullies were washed, so that grain culture was

gradually abandoned and in its place the meadows made their appearance. The clearing has gone on until most of the ridges have been cleared, except small patches of timber, which may rightfully be termed the farmer's woodlot. They vary from a few acres to thirty or forty, consisting mainly of second growth.

The growth may be seen from the following table:

SOIL, YELLOW SANDY LOAM.

Species.	Per cent
Quercus alba	24
Quercus rubra	11
Quercus tinctoria	19
Carya alba	20
Populus grandidentata	3
Acer nigrum	4
Ulmus americana	3
Juglans cinerea	16

The tree growth in the valleys of one of the smaller streams may be seen from the following table. The soil is a yellow loam with a good deposit of humus:

Species.	Per cent
Quercus macrocarpa	13
Quercus tinctoria	26
Tilia americana	25
Acer nigrum	7
Juglans nigra	15
Fraxinus viridis	6
Carya amara	8

Growth of trees on a sunny south slope, yellow clay soil:

Species.	Per cent
Quercus tinctoria	35
Carya alba	42
Ulmus americana	12
Betula papyrifera	11

On sandy alluvial drift, Pettibone Island:

Species.	Per cent
Acer saccharinum	42
Populus monilifera	8
Ulmus americana	34
Betula nigra	16

Black sandy drift soil along the Kickapoo in Hemlock grove:

Species.	Per cent
Tsuga canadensis	26
Betula lenta	31
Betula papyrifera	11
Juglans cinerea	15
Acer nigrum	12
Quercus macrocarpa	5

In western Wisconsin the following forest formations can be recognized:

1. The river formation.
2. The sandy upland.
3. The valley formation.
   a. Uplands.
   b. Bottoms.
4. The ridge.
5. The tamarack.

1. *The River Formation.*—The more important species found along the largest streams like the Mississippi, La Crosse, and Black are the following: Soft maple (*Acer saccharinum*), American elm (*Ulmus americana*), river birch (*Betula nigra*), green ash (*Fraxinus viridis*), cottonwood (*Populus monilifera*), almond-leaved willow (*Salix amygdaloides*), swamp white oak (*Quercus bicolor*), and hackberry (*Celtis occidentalis*).

Table Showing Percentage of Species.

Species.	Per cent
Acer saccharinum	37.6
Fraxinus viridis	11.6
Betula nigra	12.9
Populus monilifera	9.3
Ulmus americana	15.9
Quercus macrocarpa	4.7

2. *The Sandy Uplands.*—The sandy uplands represent the ancient beaches. There is very little humus on the surface, the soil consisting of fine sand. The surface water penetrates very rapidly and dries out very soon. Several feet below the surface there is always moisture. The species of trees found here are neither abundant nor large, the trees usually being stunted, and occur in open groves. The following species occur: Scarlet oak (*Quercus tinctoria*), green ash (*Fraxinus viridis*), burr-oak (*Quercus macrocarpa*).

3. *The Valley Formation.*—The valleys consist of alluvial bottoms along the smaller streams with an upland for the most part of side hills. These hills are dry on the exposed sunny sides, while on the north slopes they are moist. Toward the base of the hills the soil is usually free from rocks, though near the top the soil is often very rocky. The soil near the bottom is a black alluvium mixed with a little sand. The upland consists of a yellow loam overlaid with a black sandy humus. Fol-

HILLS ONCE COVERED WITH TIMBER DOWN TO THE BANK OF THE MARSH. THIS HILL HAS BEEN BADLY WASHED AWAY, OWING TO THE DENUDATION OF TIMBER IN THE VALLEYS ABOVE.

lowing are some of the percentages of the different trees at different places.

On State Road Coulé:

Species.	Per cent
Quercus tinctoria / Quercus alba	48
Carya alba	27
Ulmus americana	10
Betula papyrifera	10
Negundo aceroides	2
Populus tremuloides	3

South and west and east slope, Kickapoo Valley, bank of stream:

Species.	Per cent
Acer nigrum	4
Cratægus tomentosa	1.5
Tilia americana	2
Betula alba	2
Juglans cinerea	10
Ulmus americana	8
Tsuga canadensis	32
Betula lenta	35
Populus tremuloides	1.5
Quercus macrocarpa	2

The more important shrubby plants found here were *Corylus rostrata*, *Alnus incana*, on the banks of the stream, *Ribes cynosbati*, *Prunus virginiana*, *Rubus strigosus*, *Acer spicatum*, *Sambucus racemosa*, *Taxus canadensis*, *Cornus alternifolia*, and *C. circinata*. Of the herbaceous plants, *Mitchella repens*, *Pyrola rotundifolia*, *Epigæa repens*, *Adiantum pedatum*, *Ranunculus recurvatus*, *Mitella diphylla*, *Phegopteris dryopteris*, *Aralia racemosa*, *Sanguinaria canadensis*, *Campanula rotundifolia*, *Circæa alpina*, *Viola cucullata*.

Southeast dry slope Kickapoo River:

Species.	Per cent
Prunus serotina	9
Populus tremuloides	48
Quercus macrocarpa	18
Quercus tinctoria	21
Ulmus fulva	2
Acer nigrum	2

The shrubby undergrowth consists principally of *Cornus candidissima*, *Prunus americana*, *P. virginiana* and *Rubus strigosus*.

North slope Kickapoo River:

Species.	Per cent
Acer nigrum	20
Acer rubrum	4
Populus grandidentata	10
Populus tremuloides	2
Betula papyrifera	5
Quercus alba	2
Quercus rubra	5
Quercus tinctoria	7
Quercus macrocarpa	7
Ulmus fulva	12
Tilia americana	14
Carpinus americana	15
Fraxinus americana	2
Prunus serotina	1

The shrubby undergrowth consisted of *Amelanchier canadensis*, *Prunus pennsylvanicus*, *Corylus americana*, *Rubus strigosus*, and the herbaceous vegetation of *Actæa spicata*, var. *rubra*, *Mitella diphylla*, *Brunella vulgaris*, *Viola pubescens*, *Thalictrum dioicum*.

Table Showing Rate of Growth of Hemlock (Tsuga canadensis).

No. of tree.	Diameter in inches.	Height in feet.
1	33	64
2	36	50
3	½	8
4	¾	10
5	1	12
6	½	10
7	½	10
8	¾	10
9	6	30
10	8	40
11	10	50
12	14	40
13	21	45

The above table represents simply second growth. Most of the trees have appeared since the trees were cut thirty

A WOODLOT CONSISTING OF WHITE OAK, *Populus tremuloides*, AND *P. grandidenta*. THIS IS SITUATED IN VERNON COUNTY, WISCONSIN.

years ago. The larger were probably small trees when the ground was cut over thirty years ago. The smaller trees have grown an average of 7.2 inches in height and .1 inch in diameter per year. This is not a very good growth, but this species makes better progress after the first ten years than before.

Size of Cherry Birch (Betula lenta).

No. of tree.	Diameter in inches.	Height in feet.
1	12	40
2	1	10
3	1	10
4	1.5	12
5	2	14
6	.8	40
7	14	05

The cherry birch grows quite rapidly and makes a good cover for the hemlock. The average increase in height for the years 1901–1902 was 12 inches.

Size of Other Trees.

Species.	Diameter in inches.	Height in feet.
Juglans cinerea	6	18
Juglans cinerea	3	18
Juglans cinerea	3	18
Acer nigrum	1.5	12
Acer nigrum	10	35

North slope of one of the branches of the Kickapoo River:

Species.	Per cent
Pinus strobus	27
Tilia americana	29
Betula papyrifera	9
Quercus macrocarpa	4
Quercus alba	4
Quercus rubra	3
Quercus tinctoria	1
Carpinus caroliniana	7
Populus tremuloides	1
Acer nigrum	9
Prunus serotina	3
Cratægus tomentosa	3

The shrubs found as an undergrowth of this formation consist chiefly of the following species: Hazelnut, *Corylus americana;* beaked hazelnut, *C. rostrata; Viburnum lentago, Salix humilis, Diervilla trifida, Lonicera sullivantii;* on the more sandy slopes, dry exposed situations, the *Vaccinium pennsylvanicum.*

Of the herbaceous vegetation the following plants are more or less frequent: *Hieracium canadense, Mitella diphylla, Geranium maculatum, Dodecatheon meadia, Pteris aquilina, Oenothera fruticosa, Polygala senega,* and *Comandra umbellata.*

The white pine occurring in this vicinity was cut many years ago, but a very good stand of second-growth white pine has made its appearance along with the deciduous trees. It consists, therefore, essentially of a mixed forest of white pine, white birch, oak, hornbeam, and quaking asp.

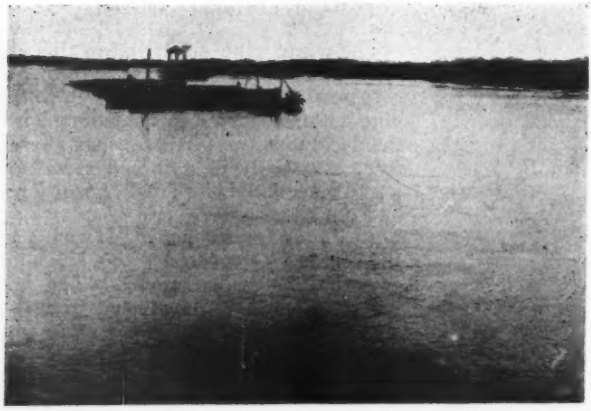
4. *The Ridge Formation.*—Originally the region was covered with a splendid growth of hardwood species. The timber here was very dense, and to make way for farms this fine timber was cut, put in large piles, and burned. Some of these ridges frequently contained solid bodies of either white or red or black oak; hence the common name white-oak ridge or black-oak ridge. Most of the original timber has long since been removed, although in a few instances some few areas are still remaining. The soil consists of a black humus on the surface from a few inches to a half foot in thickness. Underneath the humus is a yellow clay soil somewhat tenacious, but well adapted for the growth of forest trees. The soil, unless renewed by fertilizers or pastures, soon wears out, especially so since it is much subject to washing. During the last fifteen years enormous gullies have been formed, especially on the sides where the soil was cultivated. Such areas are certainly much better adapted for the growth of forest trees than for cultivated crops.

The percentage of different species of timber varies greatly, depending somewhat upon the character of the soil. As a sample illustration of the kind of plants that grow upon soils that are somewhat affected by the St. Peter sandstone, the following may serve as an illustration:

RIDGE HEAVY CLAY SOIL.

Species.	Per cent
Quercus alba	4
Quercus rubra	29
Quercus tinctoria	7
Populus grandidentata	32
Carya alba and amara	13
Populus tremuloides	14

In other instances the white oak may form 40 to 50 per cent of the growth of the native timber. In this case the soil



THE PRESENT METHOD OF HANDLING LOGS ON THE MISSISSIPPI RIVER. PHOTO TAKEN NEAR LA CROSSE, WIS.

is heavier. Such species as the red oak and black oak also grow in nearly solid bodies.

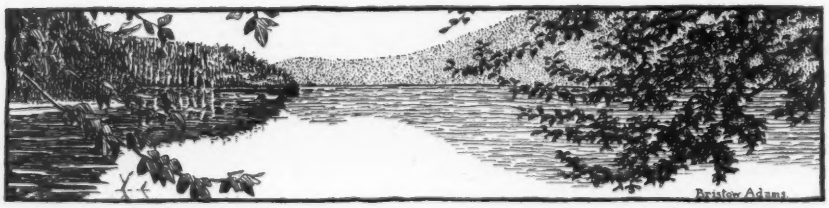
5. *The Tamarack Formation.*—There is comparatively little tamarack left in the region of western Wisconsin; the species *Larix americana* never was abundant in La Crosse and Vernon counties or in southeastern Minnesota. The writer knows of a marsh that is practically extinct in Huston county, Minnesota, and of several small marshes of 40 or 50 acres in extent in eastern La Crosse county along what is known as Mormon coulé; also another in the La Crosse Valley. These marshes were formed under somewhat similar conditions. Surrounding the marshes are low hills consisting of outcrops of Potsdam sandstone. The lower portions of this sandstone are highly retentive of moisture and form the base of the water-bearing surfaces. Surrounding these marshes one finds considerable peat, and, in a few instances, regular sphagnum bogs. Commercially, the timber has been cut for fuel, posts and rails.

Taking up some of the other plants, we find that the sandstone bluffs usually contain considerable quantities of the *Juniperus communis*. This frequently also grows right into the marsh. It should be noted also that the same species is found upon limestone rocks. Then the white pine may or may not accompany the sandy formation surrounding the marsh.

Underneath the sandstone rocks such herbaceous plants as *Pellæa gracilis*, *Aspidium spinulosum*, *Woodsia ilvensis*, and *W. obtusa*, *Gerardia grandiflora*, and *Gaultheria procumbens*.

Of the shrubby plants *Vaccinium pennsylvanicum* and *Diervilla trifida*. Bordering the marshes we find *Salix candida*, *S. lucida*, *S. discolor*, and *S. rostrata*.

Where the swamps are being filled up the *Salix longifolia* is beginning to appear in great abundance. More scattered through the tamarack marshes we find *Cornus stolonifera*, *Pyrus arbutifolia* and *Nemopanthes canadensis;* also occasionally the *Cypripedium spectabile*, *Osmunda cinnamomea* and *O. regalis*. Occasionally on the borders of the swamps is found the red maple, *Acer rubrum*, which on the hills, however, is extremely rare in this state.



CAMP LIFE AT THE YALE SUMMER SCHOOL OF FORESTRY.*

BY

Q. R. CRAFT,

BUREAU OF FORESTRY.

"THE forest students have a better time and see more of the sights than the people who sit on the hotel verandas the greater part of the time," remarked a Brooklyn young lady who spends the summer each year at Milford, Pa. It is invigorating certainly, a strenuous camp life, with daily tramps through the woods ten to thirty miles perhaps; in fact, any distance you like. The local press asserts that Pike county, of which Milford is the county seat, contains more lakes, brooks, waterfalls, and other attractions of picturesque and delightful scenery than any other county in the state, and enumerates forty-two points of interest in the county and the neighboring Shawangunk hills of New Jersey. Driving and automobiling are facilitated by the excellence of the valley roads, which are of a quality rarely found in this country except in the immediate environs of large towns. They are macadamized with the shale which abounds in cliffs along the streams, and are harder than an asphalt pavement and almost as smooth.

At Milford the murmur of waterfalls and the buzz of the sawmill take the place of the steam whistle. One of these mills in addition prepares excelsior, and another white oak chair material. Along the river road to Dingman's Ferry chestnut ties, cut from the woods which cover the hills between the two villages, are piled at convenient landings on the bank of the Delaware. These ties are seasoning to be in readiness for floating down the river to Trenton and Philadelphia. Outside of the flat alluvial land of the river bottom the whole region is a timber country, wild and rugged, naturally abounding in fish and game, and for the most part unconquerable by the plow. A better place for a forest experiment station and summer school would be hard to find.

ADVANTAGES OF THE LOCATION.

The school is cheaply accessible on account of summer season round-trip excursion rates from all eastern cities to Port Jervis, N. Y., eight miles distant. With a few exceptions, the students live in a camp, which has a breezy and healthful location on the top of a hill about a mile west of the village. The tents are pitched in the edge of the woods, while the new buildings with the baseball grounds occupy a clearing on the brow of the hill. The abundance of cold spring water, and the famous Sawkill swimming pools, where one can "shoot the chutes" over one cascade, dive, and upon emerging be ready to go over the next, help to make this cool retreat one of the most attractive places in the country to take a summer outing.

The range in altitude (the cliffs which bound the valley rise almost sheer, sometimes for about 300 feet, broken by deep gorges, through which tumble foaming streams that drain the bordering plateau) and the composition and water content of the soil are conditions which make possible the growth of an unusually large number of the trees and shrubs of the eastern United States. Added to these are the numerous species from the West and from Europe and Asia, planted on Mr. Pinchot's spacious grounds. Further opportunity is given for comparison of the growth, appearance, and habits of related spe-

* Illustrations by courtesy of Walter O. Filley.

cies, both native and exotic, in the nursery and plantation of the Forest Experiment Station, situated just east of the large walled garden at Grey Towers.

THE DAY'S WORK.

The Summer School of 1904 was attended by representatives of prominent scientific schools and colleges and by other men who, in their employments, found the urgent need of a more practical and accurate knowledge of the woods. There was no more earnest pupil than a retired physician, who wished to become his own forester on his timber tracts in southern New Jersey and western Massachusetts. Those with whom the writer talked had read Schlich's Manual of Forestry or other literature dealing with forest problems, but no amount of text-book study could compare in results with the first-hand knowledge obtainable through the field instruction combined with lectures, which constitutes the method of the Summer School.

During the past summer Prof. James W. Toumey, director of the Summer School; Mr. Arthur H. Graves, and Mr. Edward E. Carter were continuously present, and the classes were so arranged that every hour was well occupied.

Following the morning lectures at 8.30, given in Stone Cottage, a pretty example of Swiss architecture, the classes, accompanied by their professors, take a tramp through the woods to prove by observation the facts they have learned and to do practical work under the eye of the instructor. When Mr. Carter launched the class upon a steep hillside and called on its members to tell, unsupported by any volunteered suggestion, how the instruments by which accurate height measurements are mathematically obtained should be employed, it was amusing to compare the different methods proposed by the tyro foresters.

No less perplexing were some of the tests in identification of forest species, as when Mr. Arthur Graves in one of his "examinations" pointed out twenty-five trees as he strode through the woods, calling on the class without collusion to write the common and botanical name of each. The list included three trees of widely varying appearance, yet of the same species—a small red cedar with needle-shaped leaves,

DINING HALL. JUNIOR HALL. CLUB HOUSE.

THE NEW BUILDINGS.

AN ATTENTIVE CLASS TO A FIELD DEMONSTRATION.

and also small sweet and yellow birches, distinguishable mainly by taste. Or take the program of a day with Professor Toumey's class. After the early morning lecture on the relation of rocks to silviculture, all walked across the Delaware River bridge into New Jersey, to observe the tilted strata of limestone, the character of the dark-colored soil it forms, and the greater luxuriance of its vegetable growth compared with that on the disintegrated shale on the other side of the river. Recrossing to the Pennsylvania side, the class followed the gorge of the Sawkill at the water's edge, observing the layers of shale, until it reached the still poorer land abounding in boulders of Catskill sandstone and other stone of the glacial drift, Professor Toumey directing especial attention to the effect of weather, water, and tree roots in hastening the breaking up of the rocks, and similar matters.

In the afternoon field work in forest mensuration or laboratory work in the identification of plants occupies the time, except on Wednesday and Saturday half-holidays, when baseball reigns supreme. The swim before supper is seldom missed.

In the evening a bonfire is kindled in the open court of the camp, and experiences of the day are exchanged, which provoke the recital of similar adventures in the widely separated regions from which the students are gathered. Mr. Gifford Pinchot attended one of these informal gatherings, and spoke concerning the government forest-reserve policy, the importance of state forest maps in controlling forest fires, the present attitude of cattlemen and sheepmen in regard to grazing on the reserves, and current work of the Bureau of Forestry. Association with the professors around the camp-fire is enjoyed by the students, and is of much practical benefit. Then, with the class yell of "Ban-zai, Ban-zai" (the Japanese war cry, learned last summer from the Jap camp cooks), all would retire to a well-earned night's sleep.

YALE FOREST STUDENTS AT MILFORD.

To give more thorough training in forest mensuration and silviculture, a summer term was this year added to the first year of the regular two years' course at Yale. This is separate and distinct in both lectures and field work from the Summer School. Like the

Summer School, this term opens July 1, but it continues thirteen weeks, instead of seven. The presence of the Juniors not only doubles the number of men in camp, with consequent quickening of general activity and friendly rivalry in both scholarly and athletic attainments, but it brings the Summer School students in contact with those who are entering the profession of forestry and who for the most part have seen a great deal of life in the open.

SAWKILL SWIMMING POOLS.

Professor Graves was very busy, directing the studies of the Juniors, preparing manuscripts relative to forestry, and conducting the correspondence connected with the administration of the school. He was ably assisted by Mr. Carter, instructor in forestry, and by Mrs. Miller, secretary and librarian.

Part of the work of the Junior class the past summer was the felling of pitch pine on the Kinkel estate. Data were at the same time secured for a monograph on pitch pine, similar to that prepared in part in the same vicinity some years ago for white pine. More figures will probably be secured by similar treatment of a tract of 70 acres bought by Mr. Pinchot.

The forest of the Pinchot estate was divided into squares by the Senior class of the Yale School in their surveying last spring. These squares will assist in locating sample plots on which to make periodically measurements of growth. On the white pine slope between the garden and the Sawkill River bridge each tree of the different species has been numbered and otherwise marked with red paint for identification. This is the first of a number of permanent plots to be established here and in other representative regions.

It was a red-letter day for the cause of forest education when Mr. James W. Pinchot gave the Yale Forest School a summer home on his estate at Milford. The people of the village welcomed its coming, and have watched with much satisfaction the erection of the club house, Junior hall, and dining hall, which now house the school. In the village a stone building is being erected by Mr. Gifford Pinchot, to be known as Forest Hall. This will be used for the illustrated lectures, which are open to the public.

LOCAL INFLUENCE OF THE SCHOOL.

Along the Delaware River the destructive effects of the March floods are

still apparent in the débris upon some fields, the deep gullies in others, and the absence of bridges. The new wagon bridge at Port Jervis has just been completed, the crossing the past summer having been made by ferry. The driver here points out the spot where on the old bridge two spectators were viewing the magnificent spectacle when the ice raised the bridge from its foundation and hurled the men to death in the icy water. "These floods," he said, "are worse than years ago, because so much timber has been cut on the upper waters of the Delaware." And driver and passengers alike condemn the removal of the timber from a hillside near the Halfway House to supply the demands of a sawmill.

Indeed, the sentiment of forestry pervades the air in Pike county. The students are everywhere welcomed to fields and lawns, and the prohibitive signs to hunters and fishermen are evidently not intended to restrain the movements of the young foresters. One day a party was studying forest insects in the woods belonging to Monsieur Ragot, the sculptor. The sound of so many axes soon brought a number of ladies from "The Hermitage" to the spot with the inquiry, "Who gave you permission to cut those trees?" When they learned the mission of the choppers, the committee retired, saying, "That's all right. Go right ahead. You know what trees to cut, and what not to cut."

TWELFTH IRRIGATION CONGRESS.

OFFICIAL CALL FOR THE TWELFTH NATIONAL IRRIGATION CONGRESS TO BE HELD AT EL PASO, TEXAS, NOVEMBER 15 TO 18, INCLUSIVE.

ALL who are interested in conserving the great natural resources of the country, extending the habitable area, increasing the products of the land, insuring greater stability of prosperous conditions, making occupations upon the land attractive, the extension of internal trade and commerce, and a wider knowledge of a great economic movement, which has for its ultimate object the upbuilding of an empire within the borders of a great nation, are invited to attend this Congress.

The organization of this Congress will be as follows:

The permanent officers of the Congress, including the chairmen of the sections.

Members of the United States Senate and House of Representatives.

Governors of states and territories.

Ambassadors, ministers, and other representatives of foreign nations and colonies.

Members of state and territorial irrigation commissions.

Ten delegates, to be appointed by the governor of each state and territory.

Four delegates, to be appointed by the mayor of each city of more than 25,000 population.

Two delegates, to be appointed by the mayor of each city of less than 25,000 population.

Two delegates, each duly accredited by any chamber of commerce, board of trade, commercial club, or other commercial body.

Two delegates, each duly accredited by any regularly organized irrigation, agricultural, or horticultural society.

Two delegates, each duly accredited by any regularly organized society of engineers.

Two delegates, each duly accredited by any agricultural college or college or university having a chair of hydraulic engineering, forestry, or other subject related to the general purpose of the Congress.

It is respectfully suggested that in the appointment of delegates persons should be selected who are sincerely interested in and purpose attending the Congress, and that appointment be made as early as possible.

Please have full name and post-office address of delegates mailed to Executive Chairman, Twelfth National Irrigation Congress, El Paso, Texas, that they may receive special information, which will be mailed to each delegate not later than October 5, 1904.

The work of the Congress has been so greatly enlarged through the increased interest in matters pertaining to irrigation that the Executive Committee have decided to systematize the work of the next Congress according to the provisions in articles 3 and 5 of our Constitution; consequently the work of the Twelfth Congress has been divided into five sections.

Each section will be conducted by a chairman, who will be recognized as an eminent authority in his line, which insures a thorough exposition of the respective subjects through the presentation of papers, addresses, and discussion by the most eminent men interested in forestry, irrigation, climatology, and their correlated subjects.

It is confidently predicted that the coming Congress will be more highly instructive and entertaining than any Congress which has preceded it.

El Paso, the western metropolis of the Lone Star State and on the border line of Old Mexico, is making preparation for the largest Congress, in point of attendance, which we have ever held.

A general committee of its ablest citizens, supported by the unanimous sentiment of the city, is arranging a program for the entertainment of the delegates which would require too large a space to print in this call, but is so unique in character as to be interesting and enjoyable to all.

A comprehensive exhibit of the products of irrigation will be installed adjoining the great Convention Hall, especially constructed for this Congress.

Irrigation in various phases will be shown, which will include mechanics and electrical machinery and appliances.

Ample hotel accommodations can be assured to every delegate.

Special railroad rates have been made to apply from all parts of the United States to this Congress, the rates being the lowest ever made to any convention.

All newspapers and other publications are earnestly requested to give wide publicity to this official call and to impress upon their readers the far-reaching importance of this Congress.

The vice-president and members of the Executive Committee for each state are urged to make the provisions of this call as widely known as possible and insure the largest possible delegation from their respective states.

Every state in the Union is vitally and directly interested in the subjects to be discussed in the coming Congress

In the various sections information will be dispensed regarding the increasing of production by irrigation in the Atlantic states, as well as in the Pacific section, forestry problems in New England and along the Appalachian chain, as well as along the Rockies and Sierras, engineering applied to protect from the devastation by floods, drainage of the submerged areas, directing and conducting the water to its most beneficial use, climatology, with special reference to the service of the Weather Bureau throughout the United States and rural settlement, with special reference to the disposition of the surplus man.

THE EXECUTIVE COMMITTEE,
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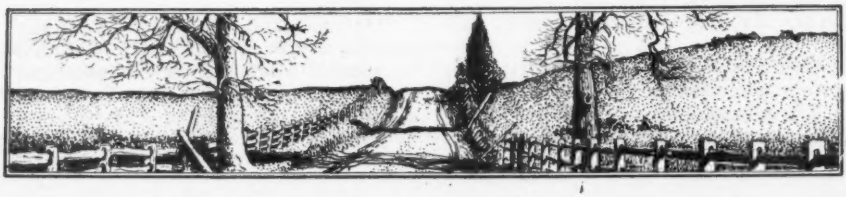
H. B. MAXSON, *Secretary.*
GEN'L COMMITTEE AT EL PASO
By W. W. TURNEY, *Chairman.*
A. W. GIFFORD, *Secretary.*
Approved:
W. A. CLARK,
President and ex-Officio Member Executive Committee.



FOREST FIRES.

THE PAST MONTH HAS WITNESSED MANY DISASTROUS FIRES IN THE NORTHWEST.

MONTANA, Oregon, and Washington have suffered severely from forest fires since the publication of our last number. Long-continued drouth, coupled with a very hot summer, have made conditions very favorable for fires. The fires reported from Washington do not appear to be in the same territory as those included in our last month's record, although generally widespread in occurrence. Fires started on the western shore of Vashon Island and near Lester, Washington, early in August, the latter fire proving one of the most serious in the state so far this season. The country south of Priest Lake and in the federal reserve 13 miles from Port Angels and near Lake Whatcom was also visited by fires more or less severe.

By prompt action large damage was averted from a fire near Foster, Washington, and near Colville ground fires destroyed crops of wheat and grain. Large quantities of dry underbrush gave foothold to a fire a short distance from Issaquah, which menaced several power plants and held up trains on the Northern Pacific, while at one time the destruction of several miles of snowsheds and several bridges along that railway were in danger from a blaze at Hot Springs. In Pierce as well as King county smouldering fires gained headway and gave trouble, while a shingle mill and dry kiln at Van Zandt were destroyed. A child 7 years old was severely burned in attempting to escape from a forest fire in Stevens county, and careless ranchers who neglected to extinguish log-heaps were responsible for a fire that penetrated into the city limits of Seattle and destroyed considerable lumber and standing timber.

Locomotive sparks started a blaze in valuable timber land two miles west of Barlow Pass, on the Monte Cristo Railroad, which damaged one of the Northern Pacific Railroad's bridges before it was put out. In the Copper Canyon Valley of the Olympics, the famous game country, much trouble was experienced in subduing several fires which threatened to assume serious proportions. At Vancouver, Washington, soldiers from the barracks assisted in quelling a fire at Fourth Plain, which destroyed a lumber mill, seven houses, and cut lumber, inflicting in all damage to the extent of $20,000, not including the standing timber destroyed. One man is under arrest for alleged incendiarism in connection with this fire, which has rendered twelve adults and twenty-three children homeless. On the Great Northern line, near Index, several days were required to extinguish a fire which caused considerable damage. In addition to these forest fires mentioned, hundreds of others, whose field of damage was only local or inconsequential, inflicted damage in practically every county of the state.

A fire which started in the latter part of July has, it is estimated, destroyed some 5,000 acres of timber in Montana, in the territory adjacent to Kalispell, and has required the combined efforts of forest rangers and a force of men placed at their disposal by the Great Northern Railroad to prevent its spread. On August 21, however, a severe rainstorm occurred, which, it is said, has practically extinguished most of the fires in this section. At Bonita, some 24 miles east of Missoula, a forest fire of considerable magnitude was discovered on August 12, and at Belton, within the limits of the Flathead Forest Reserve, a spark from a passing engine is supposed to have originated a blaze in the last week of July, which is said to have destroyed considerable valuable timber. At Athens, 17 miles west of Kalispell, a forest fire of about the same date destroyed hundreds of acres of patented land owned by the state and the Northern Pacific Railroad Company. Valuable pine timber was damaged by a fire near Columbia Falls, and at Whitefish set-

tlers narrowly escaped with their lives, losing homes and farm buildings. Dense smoke, arising from the burning of underbrush and green timber at the head of Ten Mile Creek, in close proximity to mining camps, forced miners and prospectors to abandon them.

A campfire left burning by berry-pickers in Linn county, Oregon, near Lebanon, is said to have originated a forest fire, which by August 18 had destroyed a shingle mill and devastated over 30 square miles of valuable timber, spreading over a large part of the county. In the Willamette Valley forest fires in scattered localities caused considerable uneasiness and damaged a large amount of timber. Scattered fires in Douglas county required attention on August 19, but little damage is reported to have occurred.

At Junction City, in Shasta county, California, a forest fire was reported on August 17 to have inflicted considerable damage, and Siskiyou county has had some loss through three small fires. On Bear River, in Placer county, a forest fire early in the month burned out the Rising Sun hoisting works, a stamp mill, powder mill, and office building, besides destroying several hundred cords of wood, and for a time a fire in Lytle Creek Canyon, near San Bernardino, threatened the safety of some of the big power plants supplying that city with electricity and water. At Nevada City, in Nevada county, and at Loyalton, in Sierra county, incipient forest fires occasioned minor damage.

Forest rangers in Wyoming succeeded in stamping out two forest fires which threatened to become disastrous before considerable damage ensued. They occurred in the Wind River Mountains, near Lander, and at Pinedale, near Fremont Lake.

On the north fork of Cœur d'Alene River, in Idado, numerous forest fires, principally of minor importance, destroyed a limited extent of timber in the first week of August, and a continuation of the fires near the state line of Washington also inflicted damage.

Apropos of the prevalence of forest fires on the state boundary line between Washington, Idaho, and Oregon, it is interesting to note also the destruction by forest fires in British Columbia, where immense damage has been done. In a dispatch to the *Chicago Record-Herald* four lives are reported lost through a fire near Vancouver, and the loss is placed as high as $60,000,000. Along the entire eastern side of Vancouver Island forest fires were burning on August 20, and near Victoria great damage is reported to the standing timber. On Valdez Island a clean swath has been cut by the flames, and it was said that the whole of Hornby Island was ablaze. At East Kootenay fires of large magnitude were reported, and at Fernie over $200,000 worth of valuable timber was destroyed, including the whole season's cut of logs, and the destruction of several mills narrowly averted.

Reports from Camborne, in the Kootenays, indicated a loss of $25,000 through destruction of mining buildings, offices, mills, etc. On August 19 Wellington, B. C., was in danger of complete destruction, and grave danger was apprehended from the close proximity of a large powder magazine to the path of the flames. It is understood that much property was destroyed in the town's outskirts. Nelson, B. C., was threatened in a like manner. The Canadian government also suffered through the destruction of 20,000 railway ties in a large bush fire in the Temiskaming district of Ontario, while in Newfoundland renewed outbreaks of forest fires destroyed valuable timber. It is stated by the Canadian press that so far this season $20,000,000 worth of timber has been destroyed in the interior of Newfoundland by forest fires, and the fires in British Columbia are pronounced the most destructive since 1896.

Outside of a small forest fire near Verdi, Nevada, and one of inconsiderable magnitude on the Gila River Forest Reserve of Arizona, no further fires have occurred in the West, and, so far as newspaper reports show, no fires of any magnitude have occurred in the eastern half of the United States, except near Gaylord, Michigan, where some damage to buildings and crops was sustained late in July.

Foresters and Inspectors Wanted for the Philippine Forestry Bureau

The salaries of Foresters, Assistant Foresters, Inspectors, and Assistant Inspectors range from $1,200 to $2,400 per year. Actual and necessary traveling expenses to and from the scene of field work are allowed, and while in the field one dollar gold per day is allowed for subsistence.

There are a number of vacancies in the different grades, and good men are urgently needed for this interesting and important work.

The work of the Foresters is, to a large extent, technical; that of the Inspectors more administrative and less technical.

Examinations will be held in different parts of the United States about July 1 and November 1. For detailed information apply to the Bureau of Forestry, Washington, D. C., or to the Bureau of Insular Affairs, War Department, Washington, D. C.

Foresters and Inspectors now in the Philippine forest service and having from two to three and a half years' service, find the work very attractive, instructive, and healthful.

Copies of the Philippine Civil Service Manual may be obtained from the Bureau of Insular Affairs, War Department, Washington, D. C.

The reports, bulletins, and other publications of the Philippine Forestry Bureau should be read by all desiring to enter the service. Copies may be obtained by addressing the Forestry Bureau, Manila, P. I.

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DEPARTMENT OF THE INTERIOR, U. S. GEOLOGICAL SURVEY, RECLAMATION SERVICE, WASHINGTON, D. C., AUGUST 16, 1904. Sealed proposals, in duplicate, will be received until 10 o'clock a. m., September 22, 1904, at the office of the U. S. Reclamation Service, Chamber of Commerce Building, Denver, Colorado, for the construction and completion of a telephone system about twenty-eight miles in length, in connection with the Uncompahgre Valley Reclamation Project, near Montrose, Colorado. Specifications, forms of proposal, and particulars may be obtained after August 20, 1904, by applying to A. L. Fellows, U. S. Geological Survey, Chamber of Commerce Building, Denver, Colorado, to the Engineer of the U. S. Reclamation Service, Montrose, Colorado, or to the Chief Engineer of the U. S. Reclamation Service, Washington, D. C. Each bid must be accompanied by a certified check payable to the order of the Secretary of the Interior for 2 per cent. of the contract price as a guaranty that the bidder will, if successful, promptly execute a satisfactory contract and furnish bond in the sum of 50 per cent. of the contract price for the faithful performance of the work. The right is reserved to reject any and all bids and to waive technical defects if the interests of the Government require it. Bidders are invited to be present. Proposals must be marked "Proposals for telephone system, Uncompahgre Valley Project, Colorado." THOS. RYAN, *Acting Secretary.*

DEPARTMENT OF THE INTERIOR, UNITED STATES GEOLOGICAL SURVEY, RECLAMATION SERVICE, WASHINGTON, D. C., JULY 29, 1904. Sealed proposals, in duplicate, will be received at the office of the U. S. Reclamation Service, at Montrose, Colorado, until 10 o'clock a. m., October 5, 1904, for the construction of the Gunnison Tunnel and approaches, involving 30,000 linear feet, more or less, of tunnel and about 120,000 cubic yards of excavation in open cut at the lower portal, the same being a portion of a system for the diversion of about 1,300 cubic feet of water per second from the Gunnison River to the Uncompahgre Valley, Colorado. Specifications, form of proposal, and plans may be inspected after August 10, 1904, at the office of the Chief Engineer of the U. S. Reclamation Service, Washington, D. C., at the office of the District Engineer, U. S. Reclamation Service, Chamber of Commerce Building, Denver, Colo., or at the office of the U. S. Reclamation Service, Montrose, Colo. Each bid must be accompanied by a certified check for $10,000, payable to the Secretary of the Interior, as a guaranty that the bidders will, if successful, promptly execute a satisfactory contract and furnish bond in the sum of $150,000 for the faithful performance of the work. The right is reserved to reject any or all bids, and to waive technical defects, as the interests of the service may require. Bidders are invited to be present. Proposals must be marked "Proposal for the construction of the Gunnison Tunnel, Uncompahgre Valley Project." THOS. RYAN, *Acting Secretary.*

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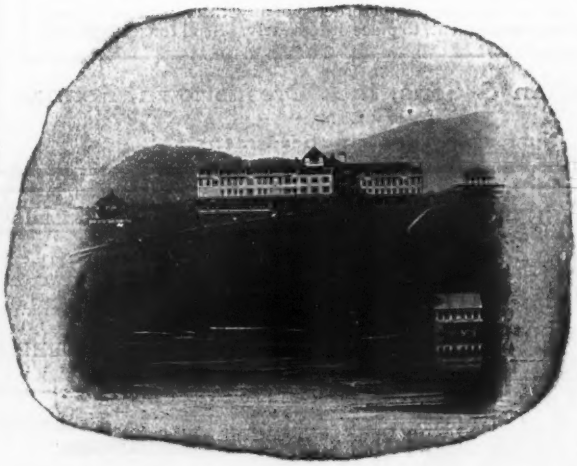

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MAGAZINE

THE National Irrigation Association

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The objects of the Association, as set forth in its Constitution, are as follows:

1. The adoption by the Federal Government of a permanent policy for the reclamation and settlement of the public domain, under which all the remaining public lands shall be held and administered as a trust for the benefit of the whole people of the United States, and no grants of the title to any of the public lands shall ever hereafter be made to any but actual settlers and homebuilders on the land.

2. The preservation and development of our national resources by the construction of storage reservoirs by the Federal Government for flood protection, and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction.

3. The construction by the Federal Government of storage reservoirs and irrigation works wherever necessary to furnish water for the reclamation and settlement of the arid public lands.

4. The preservation of the forests and reforestation of denuded forest areas as sources of water supply, the conservation of existing supplies by approved methods of irrigation and distribution, and the increase of the water resources of the arid region by the investigation and development of underground supplies.

5. The adoption of a harmonious system of irrigation laws in all the arid and semi-arid states and territories under which the right to the use of water for irrigation shall vest in the user and become appurtenant to the land irrigated, and beneficial use be the basis and the measure and limit of the right.

6. The holding of an annual Irrigation Congress, and the dissemination by public meetings and through the press of information regarding irrigation, and the reclamation and settlement of the arid public domain, and the possibilities of better agriculture through irrigation and intensive farming, and the need for agricultural education and training, and the creation of rural homes as national safeguards, and the encouragement of rural settlement as a remedy for the social and political evils threatened by the congestion of population in large cities.

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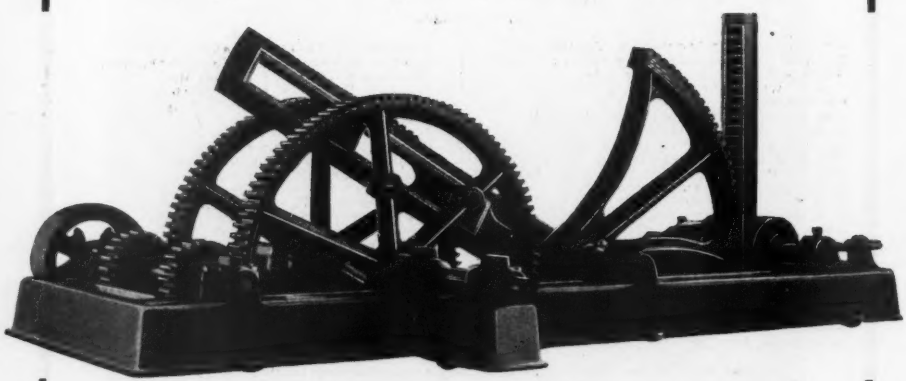

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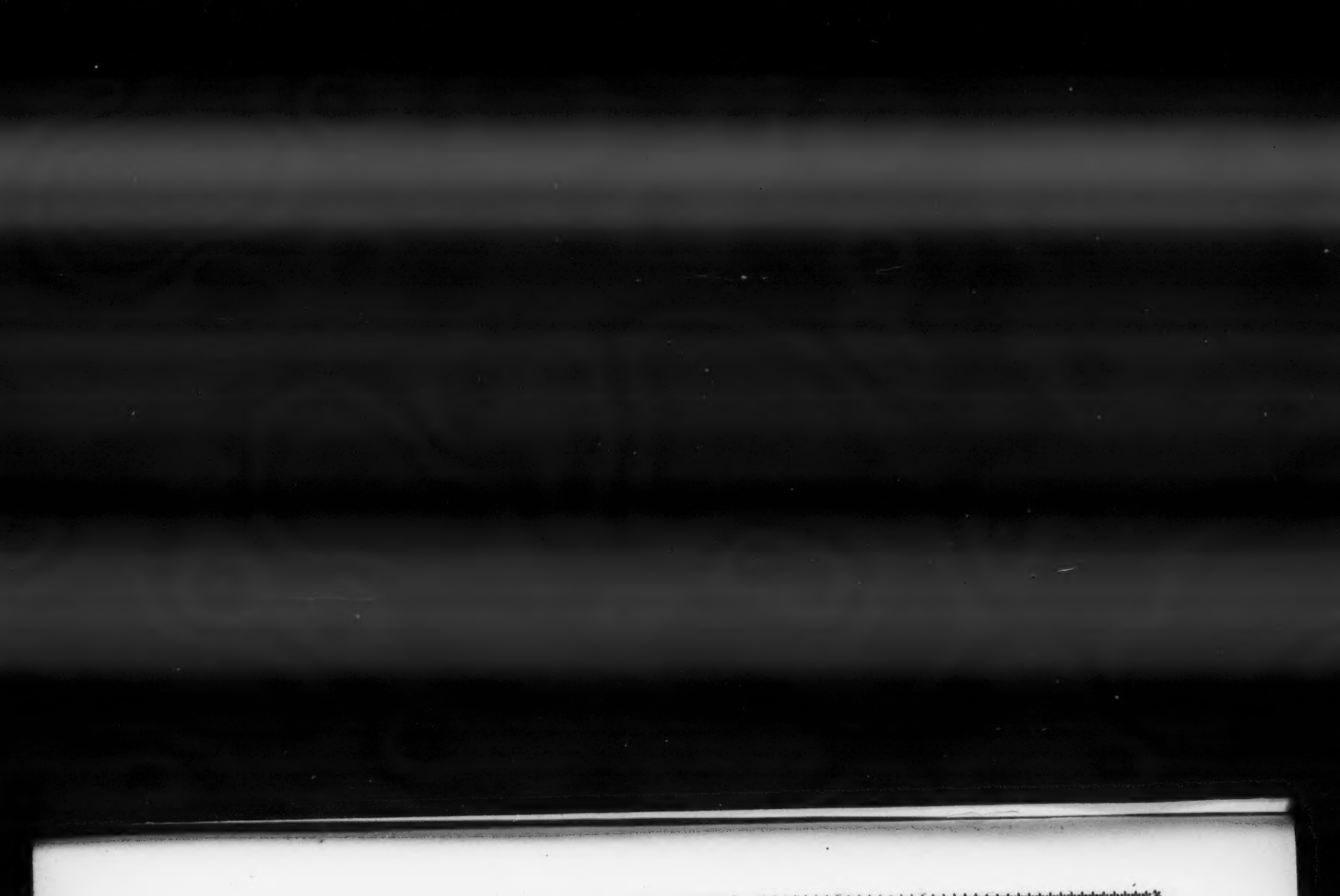

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